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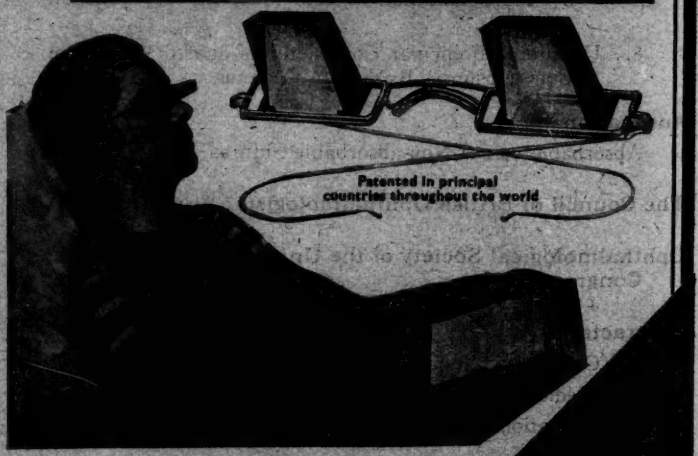

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THE BRITISH JOURNAL

OF

OPHTHALMOLOGY

MAY, 1944

COMMUNICATIONS

RETINOSCOPY IN ASTIGMATISM

BY

M. KLEIN

LONDON

MEASURING astigmatism by means of retinoscopy is theoretically simple, and consists of ascertaining the point of reversal for each principal meridian separately, and by subtracting the refraction of one from the other the amount of astigmatism is found (Jackson)[4]. Jackson mentions further that descriptions of retinoscopy allude to the characteristic band-like appearance of the light in astigmatism. Such an appearance, however, cannot be perceived, except with certain lenses, or at certain distances in front of the eye, and it is a reliable indication only when the light, the mirror, and the patient's and observer's eye are brought into a certain relation.

In astigmatic eyes it may be observed that the direction of the reflex-movement does not coincide with the direction along which the light is driven by the swinging of the mirror. This apparent change of the principal meridians of the astigmatism may vary during retinoscopy, and it is of practical importance to know the conditions in which this occurs, and how to avoid it.

From The Central London Ophthalmic Hospital.

The two methods by which the accuracy of retinoscopy can be increased are: (*a*) the systematic use of trial cylinders, and (*b*) streak-retinoscopy. To appreciate the principles upon which these methods are based (1) the combined optical effect of two obliquely crossed cylinders, and (2) the shape of the image of the immediate source of light (image of retinoscopic lamp through the mirror) on the patient's retina, and its rôle in retinoscopy have to be considered.

Obliquely crossed cylinders, and their implication for "cylinder retinoscopy"

Historical.—In his classical book Jackson (1896) stresses the importance of the systematic use of cylinders. The retinoscopic test cannot be regarded as complete if the cylinder such as is required to correct the astigmatism is not placed before the eye, and then the test repeated so as to ascertain whether the astigmatism has been accurately corrected. He described also the effect of a cylinder placed in a wrong axis, and gave its interpretation.

In 1903 Duane[1] pleaded for the systematic use of cylinders. He gave this description: If the cylinder is in the wrong axis the shadow makes a skew or oblique movement. When this happens the axis has to be shifted one way or the other until the obliquity disappears. The right strength of the trial cylinder is found by changing the cylinder until reversal takes place. Duane said further that although the use of cylinders is more circumstantial, in the end it saves time by shortening the subjective test.

The use of cylinders in retinoscopy, however, in spite of the spirited efforts of Jackson, Duane and others did not gain popularity and it remained the method of few ophthalmologists only. This is reflected by the fact that The American Encyclopedia of Ophthalmology (1918) gives relatively little space to the use of cylinders.

The position changed since 1920 after the works of Lindner[8, 9], Krämer[7a, 7b], and others, when the implications of oblique cylinder ideas (put forward by Jackson) were presented in a simple way, and the rules of "cylinder-retinoscopy" were laid down.

The effect of obliquely crossed cylinders is shown in Table I. Each vertical column stands for a group, and not for a single combination only. For instance $\frac{c.+1}{c.+1}$ (column I) stands for all cases where the cylinders are of equal power, and the real power can be calculated simply by multiplication. In the case of $\frac{c.+0{\cdot}5}{c.+0{\cdot}5}$

TABLE I

		I	II	III	IV	V	VI		
	$\frac{F_1}{F_2}$	+1·0 cyl. / +1·0 cyl.	+1·12 cyl. / +1·0 cyl	+1·25 cyl. / +1·0 cyl.	+1·5 cyl. / +1·0 cyl.	+1·75 cyl. / +1·0 cyl.	+2·0 cyl. / +1·0 cyl.		
A	Axis of F_2 90°	S. +1·0 / C. 0·0	S. +1·0 / C. +0·12 0°	S. +1·0 / C. +0·25 0°	S. +1·0 / C. +0·5 0°	S. +1·0 / C. +0·75 0°	S. +1·0 / C. +1·0 0°	90°	A
B	85°	S. +0·91 / C. +0·175 42½°	S. +0·95 / C. +0·22 25½°	S. +0·96 / C. +0·32 16½°	S. +0·97 / C. +0·55 9½°	S. +0·99 / C. +0·77 6½°	S. +0·98 / C. +1·05 5°	85°	B
C	80°	S. +0·83 / C. +0·34 40°	S. +0·85 / C. +0·4 31°	S. +0·87 / C. +0·5 25°	S. +0·94 / C. +0·62 16°	S. +0·95 / C. +0·86 11°	S. +0·97 / C. +1·1 8½°	80°	C
D	75°	S. +0·74 / C. +0·52 37½°	S. +0·78 / C. +0·56 31½°	S. +0·81 / C. +0·63 26½°	S. +0 85 / C. +0·81 19°	S. +0·87 / C. +1·01 14½°	S. +0·88 / C. +1·24 12°	75°	D
E	70°	S. +0·67 / C. +0·65 35°	S. +0·65 / C. +0·8 30½°	S. +0·72 / C. +0·85 28°	S. +0·76 / C. +0·98 22°	S. +0·8 / C. +1·15 16½°	S. +0·83 / C. +1·4 14°	70°	E
F	60°	S. +0·5 / C. +1·0 30°	S. +0·5 / C. +1·1 27°	S. +0·55 / C. +1·15 24½°	S. +0·6 / C. +1·3 20½°	S. +0·62 / C. +1·5 17°	S. +0·65 / C. +1·75 15°	60°	F
G	50°	S. +0·35 / C. +1·3 25°	S. +0·35 / C. +1·4 22°	S. +0·4 / C. +1·45 20½°	S. +0·44 / C. +1·62 17½°	S. +0·44 / C. +1·82 15½°	S. +0·45 / C. +2·1 14°	50°	G
H	40°	S. +0·23 / C. +1·55 20°	S. +0·24 / C. +1·65 18°	S. +0·26 / C. +1·72 17°	S. +0·29 / C. + 1·92 15°	S. +0·3 / C. +2·15 13½°	S. +0·35 / C. +2·4 12°	40°	H
I	30°	S. +0·12 / C. +1·75 15°	S. +0·13 / C. +1·9 14°	S. +0·15 / C. +1·95 12½°	S. +0·15 / C. +2·2 12°	S. +0·17 / C. +2·4 10½°	S. +0·18 / C. +2·65 9°	30°	I
J	20°	S. +0·1 / C. +1·8 10°	S. +0·06 / C. +2·0 9°	S +0·07 / C. +2·1 8½°	S. +0·07 / C. +2·35 7½°	S. +0·08 / C. +2·58 7°	S. +0·1 / C. +2·85 6°	20°	J
K	10°	S. +0·025 / C. +1·95 5°	S. +0·01 / C. +2·1 4½	S. +0·02 / C. +2·2 4½°	S. +0·025 / C. +2·45 4°	S. +0·025 / C. +2·7 3½°	S. +0·02 / C. +2·95 3°	10°	K
L	0°	S. 0 / C. +2 0°	S. 0 / C. +2·12 0°	S. 0 / C. +2·25 0°	S. 0 / C. +2·5 0°	S. 0 / C. +2·75 0°	S. 0 / C. +3 0°	0°	L
	Difference between $\frac{F_1}{F_2}$	0 %	12·5 %	25 %	50 %	75 %	100 %		

The angle of the resulting astigmatism starts from the axis of the stronger cylinder which is the zero point.

The values were taken from curves in the paper "A note on the transposition on obliquely crossed cylinders" by H. H. Emsley.[2] Small errors may be present in some of the values from curves drawn to so small a scale. This, however, has no significance to the conclusions drawn. My thanks are due to Mr. H. H. Emsley for filling in the values of 85° and 75°, and for making slight corrections in some of the other values.

the multiplication factor is 0·5, and in case of $\frac{c.+3}{c.+3}$ the multiplication factor is 3, *i.e.*, the power of the cylinders. Column (IV) $\frac{c.+1·5}{c.+1·0}$ represents all cases where the ratio between the two cylinders is one to one and a half, *i.e.*, $\frac{c.+3}{c.+2}$ or $\frac{c.+4·5}{c.+3·0}$ etc. The real optical power of the combination is obtained by multiplication with the dioptrical power of the weaker cylinder.

Table I shows that in case of obliquely crossed cylinders a new sphero-cylindrical combination is obtained and (1) if the two cylinders are of *equal* power (vert. column 1) the axis of the resulting cylinder halves the angle formed by the axes of the crossed cylinders. For instance in the case of $\frac{c.+1}{c.+1}$ crossed at 60° the axis of the resulting cylinder will fall at 30°.

(2) If the cylinders are of *unequal power* the axis of the resulting cylinder will not halve the angle formed by the axes of the obliquely crossed cylinders, but it deviates toward the axis of the stronger cylinder. In horizontal column "B" (85°) it is seen that the axis of the resulting cylinder varies from 42·5° to 5°, as the ratio of the two cylinders increases from one to one, to two to one.

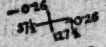
These data can be applied to *all* cases of astigmatism, to myopic as well as to hypermetropic, if it is assumed that the cylinder component of the eye is a plus cylinder. Cases where a minus cylinder is required need cause no difficulty as every minus cylinder can be expressed as a combination of a plus cylinder and a minus sphere of equal power. In the case of a myopic astigmatism the more myopic meridian should be corrected with spheres and then a plus cylinder used. By this justifiable simplification the effect of obliquely crossed plus and minus cylinders, and of two obliquely crossed minus cylinders can be omitted.*

In making practical use of the oblique cylinder ideas in retinoscopy it is important that the compound astigmatism of the eye should first be converted into a simple one by placing the required spheres before the eye, *i.e.*, the one principal meridian should be at the point of reversal.

The implications of Table I for retinoscopy with cylinders are the following: (a) Column I represents the cases when the eye cylinder and the trial cylinder are of equal power, *i.e.*, the correcting cylinder is of the right strength. At 90° (Column IA) the resulting power is s.+1·0. If, however, the trial cylinder is in

* The largest angle in Table I is 90°, as this is the maximum which can occur. An angle of 110°, *e g.*, is equal 70° starting from 180°.

a wrong axis either through carelessness or placed purposely so, the combined optical effect of the eye-cylinder and trial-cylinder will give other dioptrical values. If the resulting astigmatism is in any meridian more than 1·0D., it means over-correction, *i.e.*, myopia, and if less than 1·0D. it means under-correction, *i.e.*, un-corrected hypermetropia. For instance if c.+1·0 is placed at 75° (Table I, column ID) $\frac{\text{s.}+0{\cdot}74}{\text{c.}+0{\cdot}52}/37{\cdot}5°$ is obtained which can be written in the usual way

The +0·74 spherical element of this combination leaves 0·26D. uncorrected hypermetropia in that meridian, while 0·52D. cylinder element over-corrects the meridian 127·5° by 0·26D. and an equally mixed astigmatism results 

To correct the hypermetropic element of this resulting astigmatism a plus cylinder at 127·5° would be required.

If other values of column I are analysed in the same way, it will be seen that *in all cases an equally mixed astigmatism* is produced, and the axis of the resulting cylinder falls at the halving angle formed by the axes of the eye cylinder and trial cylinder.

Column I shows further that the amount of this new astigmatism increases with the error of the axis of the trial cylinder. In order to elicit a noticeable amount of resulting astigmatism in case of weak cylinders it may be necessary to place the trial cylinder at a false angle up to 20 to 30°, while in cases of stronger cylinders (above 2·5D.) a few degrees are sufficient.

Horizontal column " A " from II to VI represents cases where there is an under or over-correction but the axis of the trial cylinder is correct. And here—as can be seen in the table—no change in the apparent principal meridians occurs. In horizontal columns " B " to " L " from II to VI, the trial cylinder is in the wrong axis and is of wrong power. In case of an error of 5° (column B) the axis of the resulting astigmatism varies from 25·5° to 5°, and the angle becomes smaller with the increase of the under resp. over-correction. If the ratio between eye-cylinder and trial-cylinder is 1 : 1·12, *i.e.*, one eighth under or over-correction, the axis of the resulting astigmatism falls at 25°. At the increase of the ratio to 1 :1·5 it falls at 11°. In case of under-correction, *i.e.*, where the eye-cylinder is stronger than the correcting cylinder, the axis of the resulting astigmatism will fall nearer to the axis of the eye cylinder, and in over-correction it will fall nearer to the axis of the trial cylinder. The axis of the stronger cylinder is always the " zero " point, and the angles given in the table start from here. If in a case of refraction a trial cylinder of insufficient strength, *e.g.*, +1·0D. is placed at 85°, the axis of the

resulting astigmatism will fall at 11°, starting from 0°, the position of the axis of the eye-cylinder which is here the stronger cylinder. But if a too-strong trial-cylinder, *e.g.*, +2·25D. be placed at 85° the axis of the resulting astigmatism falls at 74°, *i.e.*, 11° starting from 85° the position of the trial-cylinder which is here the stronger cylinder.

From a clinical point of view it is important to know that the wrong axis of *a plus trial cylinder can be corrected if it is turned toward the axis of that plus cylinder which would correct the hypermetropic component of the resulting astigmatism* (Jackson). And this may be termed as the " plus axis " of the resulting astigmatism. This is in accordance with the everyday practice to mark the position of the axis of the astigmatism, and its character in terms of the required cylinder to correct it.*

In the example on page 209 the cylinder of the right strength is placed in the wrong axis of 75° instead of 90°. The position of the plus cylinder required to correct the resulting astigmatism (plus axis) would be 127½°. The trial cylinder has to be turned in that direction, *i.e.*, towards its correct direction, and at 90° the resulting astigmatism will disappear. If the cylinder is turned a little further the resulting astigmatism will appear on the other side of the vertical.

In case of an under-correction where the ratio between trial-cylinder and eye-cylinder is 1 : 1·5 such as a case of $\overset{00}{+1·75\ 90°}$, and a too weak cylinder c. +1·0 is placed at 80° (Table I, IVC) resulting in $\frac{\text{s.}+0·94}{\text{c.}+0·62/16°.}$ $\overset{+1·56}{16°+0·94\ 106°}$

The spherical element of 0·94D. leaves 0·56D. uncorrected, *i.e.*, hypermetropia, while the resulting cylinder c.+0·62D. will over-correct by 0·06D. the meridian at right angle, producing 0·06D. myopia $\overset{-0·06}{16°+0·94\ 106°}$. An un-equally mixed astigmatism is thus elicited, the *plus axis* of which falls nearer to the axis of the trial cylinder. In the same case if a too strong cylinder say +2·25D. is placed before the eye at 80° the ratio remains 1 : 1·5, and the optical power of the resulting astigmatism will be $\frac{\text{s.}+1·41}{\text{c.}+0·93\ \ 16°}$†. The axis of the resulting astigmatism starts from the axis of the cylinder, from 80°, and falls at 64° $\overset{154°\ +1·41}{64°\ +2·34} = \overset{154°\ +0·03}{64°\ -0·84}$. The plus axis of this resulting astigmatism is at 154°. In a case of over-correction the plus-axis of the resulting astigmatism falls farther away from the axis of the trial cylinder.

* The axis of the resulting astigmatism must not be confused with the axis of the cylinder to correct it. The latter is at right angle to the former.

† (Table I, IVC, multiplied by 1·5, the optical power of the weaker cylinder).

As can be seen Jackson's rule holds true for all cases, in under-, and over-correction as well as when the trial cylinder is of the right strength; and the wrong axis of a plus trial cylinder can be corrected by turning it towards the plus axis, or turning it away from the minus axis of the resulting astigmatism.

Rules of cylinder-retinoscopy summarized after Lindner[9]:

(1) *Power.*—If the trial cylinder is of right power, but in a wrong axis, the resulting astigmatism will be (*a*) an equally mixed one, and (*b*) its plus axis will fall at right angle to the halving angle of that formed by the axes of eye-cylinder and trial-cylinder.

If a plus trial-cylinder is too strong the resulting plus axis will fall farther away from the axis of the trial cylinder: and if too weak the resulting plus axis will fall nearer to the axis of the trial-cylinder. The character of the resulting astigmatism will be an unequally mixed one, with a more marked myopic character in the first case, and more marked hypermetropic character in the second.

(2) *Axis.*—If trial cylinders of different strength are placed before the eye purposely in a false meridian, the axis of the resulting astigmatism will vary with each cylinder (column B to L places II to VI), whereas *if the axis is correct* (column A II to VI) *the trial cylinders of different strength will cause no change in the apparent axis of the astigmatism.*

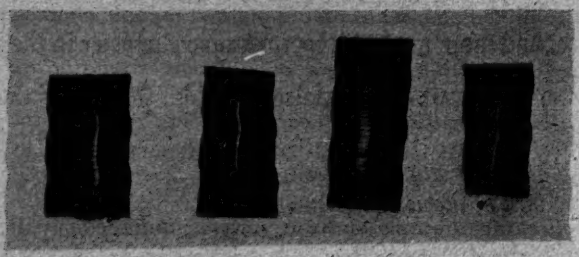
For checking the axis *and* the power simultaneously Percival[11] suggested the following test: A trial cylinder of 7/8th of the power really required is placed before the eye, and while the error of its axis be 5°, the plus axis of the resulting astigmatism will suggest six times as great an error (column IIA in Table I).

The shape of the retinal image of the light source and its rôle in streak retinoscopy

During retinoscopy not only the image of the light-source, but also that of the mirror is formed on the patient's retina. Image and source correspond to each other in shape and direction. If the source is circular its image will be circular in eyes with spherical refraction, and elongated in case of astigmatism. The direction of this elongated light-patch on the patient's retina depends upon the direction of the axis of astigmatism. If on the other hand the light-source is a lineal or a long one, and its position, *e.g.*, vertical, its retinal image will be long and vertical. In an astigmatic eye the position and the shape of the retinal image remains the same as that of the source, but it becomes somewhat distorted. For instance in an eye with hypermetropic astigmatism with the rule the axis of the eye-cylinder is at 180°, and having its optical effect at right angles, the retinal image will, therefore, be elongated in the vertical direction. The retinal image will

become longer and thinner, and if the light-source is a straight-line incandescent element of an electric bulb, the retinal image will be a very distinct and brilliant line. If, however, the axis of the eye-cylinder be vertical (astigmatism against the rule), the retinal image of the vertical source will become a broader light-band, and its brightness will be poor as compared to the previous one. In both cases, however, the outlines will be rectangular. But if the position of the eye cylinder be oblique, the width of the retinal image will be broader than in the first case, and narrower than in the second, its ends will have no right angles, and the slope of the ends of the image will depend on the angle formed by the light-source and the axis of the cylinder.

FIG. 1.



A B C D

Photograph of a strip lamp.

A, normal photograph. B, add +1·0 cyl. axis 180°.
C, add +1·0 cyl. axis 90°. D, add +1·0 cyl. axis oblique.

These conditions are true only for the case when one of the meridians is emmetropic, if, however, the astigmatism is compound, the retinal image becomes more blurred, and the differences on rotating the light-source or cylinder will be less defined.

When using a lineal or long (non-circular) light-source for retinoscopy a change in the apparent principal meridians of the astigmatism may be noticed. The following experiment shows the conditions: If a strong cylinder +10·0D. is placed on a vertical line with its axis at 90°, and, now, the cylinder is moved away from the line (the observer's eye should be about 60-70 cm. from the line) it will be noticed at a certain distance that the vertical line makes a turn of half a circle. This turning round is sudden, and at that point of reversal the eye and the vertical line are conjugated foci. If, now, this experiment is repeated so that the axis of the cylinder is at 80° i.e., the axis of the cylinder and the vertical line form an angle of 10°; and the cylinder is moved as before, the position of the vertical line appears to rotate gradually,

and the apparent direction of the line will depend upon the distance of the cylinder from the line. If now the observer's eye moves towards the cylinder, this apparent rotation occurs in the reverse direction until the line appears in its original position[12]. The apparent position, *i.e.*, the degree of rotation of the line depends upon the distance of the cylinder from the line and from the observer's eye, and upon the dioptric power of the cylinder.

If a long light-source (filament of a streak-retinoscope, or oblong shaped, or lineal lamp) is used for retinoscopy, and the direction of the source does not coincide with that of the principal meridian of the astigmatism, the direction of the retinoscopic shadow movement may show a rotation, causing a change in the apparent axis of the astigmatism. The reason of this is similar to that of the previous experiment. If the observer moves nearer or farther from the eye, or if the observer is at one metre distance but spectacle lenses are placed before the patient's eye by which the refraction of the eye is altered, this rotation may appear.

In clinical retinoscopy this may be a potential source of error in estimating the axis of astigmatism. If the mirror is driven along a meridian that does not coincide with one of the principal meridians the reflex moves along a new meridian which is different from the principal meridians and from the direction of the swinging of the mirror. In an astigmatic eye the retinal image of a circular light-source is an elongated one, and therefore this apparent change of the axis of the astigmatism may appear even with circular sources. But it is particularly marked if the light-source is a long or lineal one. The first calculations of this rotation of the reflex movement were made by Borschke (1904). In the more available recent works reference to the mathematics of this phenomenon can be found in H. H. Emsley: Visual Optics, p. 547[3].

The lineal light-source can be used for checking the axis and the amount of the astigmatism. The basis of checking the axis is that the rotation, or change of the direction of the shadow-movement occurs only when the lineal or long light-source is not in the axis of the astigmatism, and it does not occur if the position of the light-source coincides with one of the principal meridians. Therefore the lamp has to be rotated into a position when this change does not occur any more when new lenses are placed before the eye, or when the distance between observer and patient is altered; and that position of the streak will indicate the principal meridian. For checking the amount of the astigmatism the streak is placed purposely in a wrong axis (see later), and this method of checking the amount of astigmatism can be compared with the trial cylinder placed in a wrong axis (p. 211).

From a historical point of view it is interesting that the use of a

lineal retinal image for ascertaining the principal meridians of the astigmatism was first described by E. Jackson (1895) and by this he laid the foundation-stone of streak-retinoscopy. The following quotation will illustrate this:

When the observer's eye is placed at the point of reversal for one meridian, the retinal image becomes greatly magnified in the direction of that meridian, while comparatively little magnified in the direction at right angles to it. Each point of the retina then appears in the pupil as a line running in the direction of that principal meridian, giving a band-like appearance of the light in the pupil. The direction of this light-band is always that of the principal meridian at whose point of reversal it is seen.

For example: Refr. $+\frac{1}{12}$ and plane mirror is used. At half a metre from the eye the mirror will be at the point of reversal for the vertical meridian. Now if the source of light be placed as close to the mirror as possible the rays from it will be the more accurately focused upon the retina in the vertical meridian, and more diffused horizontally, so that the real form of the retinal light-area will be rather that of a *horizontal* line or band.

Now from the observer's position, the retina is most magnified in the vertical direction, and this vertical magnification would cause a point of light on the retina to appear as a vertical band in the pupil, but, with the light-area really in the form of a horizontal band, the effect of the vertical magnification is largely neutralized, and the appearance in the pupil may be quite indefinite.

The band-like appearance can be brought out if, while keeping the observer's eye and mirror in the same position, the original source of light is pushed off from the mirror one half metre; the immediate source then retracts correspondingly behind the mirror, and approaches the position of the point of reversal in the horizontal meridian, one metre from the eye.

With the light and mirror in this relation to the eye, the rays are perfectly focused upon the retina in the horizontal meridian and diffused in the vertical meridian, so that the real form of the retinal area of light is a *vertical line or band*. This vertical line or band being viewed from the point of reversal of the vertical meridian where it will be greatly magnified in the vertical direction, and but slightly magnified in the horizontal direction gives rise to the appearance of the most distinct vertical band of light in the pupil. And, under these conditions, the presence of the astigmatism and the direction of one of its principal meridians is most clearly and accurately revealed.

Of this description it is clear that the lineal retinal image elicited in an ingenious way can be regarded as the first form of streak-retinoscopy.

Wolff's instrument (1896), in which the electric bulb is rotatable and by that the lineal incandescent element of the bulb can be brought in any position, made a further advance. By rotation of the electric bulb the lineal retinal image is easily obtained, and there is no need to place the immediate source in the point of reversal of the other principal meridian. The construction of Wolff's instrument is essentially the same as that of the modern streak retinoscopes Purvis, Reid, etc. A strong convex lens and a mirror at 45° project the image of the filament to the patient's eye. Wolff[14] advised that the lamp should be focused so that a long broad light-patch should fall on the patient's face, and by turning the bulb this light-patch can be rotated. Wolff claimed that by the use of this instrument the axis of the astigmatism can be determined to an accuracy of one degree, and the refraction to one eighth of a dioptre.

Recently, however, the focusing is set so that the lightpatch on the patient's face is narrow, about the diameter of the pupil. This light-streak gives a bright lineal retinal image which can be seen in the pupil as the streak reflex. If the instrument is focused so that the filament-image falls in front of the patient's pupil between the retinoscopic mirror and the patient's eye the retinoscope is used as a concave mirror, and if the filament-image falls behind the patient's pupil it will act as a plane mirror. Commonly it is used as a plane mirror.

While in Wolff's focusing the emphasis was on the shadow movement, now it is put on the behaviour of the streak-reflex. The point of reversal is determined in the usual way by the disappearance of the "with" or "against" movement of the streak-reflex. At the point of reversal the streak-reflex disappears and the pupil becomes filled with light. This change is marked and easy to observe.

Method of examination : The streak is thrown on the pupil, and should be moved at right angles to its length. If the streak is set horizontally it has to be moved up and down, and if vertically, from left to right or vice versa. The characteristics of the reflex are then noted. Is it wide or narrow, clear cut or indistinct, has it the same characteristics in all meridians? In higher degrees of ametropia the retinal image of the filament becomes less distinct, or the streak character becomes unrecognisable. In the proximity of the point of reversal the streak-reflex gains in distinctness, and if no astigmatism is present, the thickness of the streak-reflex will be the same in all meridians if the bulb is turned round[13]. On the other hand in astigmatic eyes the thickness of the streak will vary in different meridians. In a compound hypermetropic astigmatism with the rule, for instance, $+1+4_{42}$ first a "with" movement is

seen in all directions, and the streak-reflex will be fairly wide, it will appear more markedly in the vertical meridian. First the refraction of the vertical meridian is determined, and for this the streak is placed in a horizontal position. If the position is not 180° but deviates slightly, *e.g.*, 10° or 170°, the movement of the reflex, or of the shadow, will not coincide with the swinging of the retinoscope. This new direction of the reflex-movement will vary with the power of the lens placed before the eye, or if the distance between patient and examiner is altered. On the other hand if the position of the streak is at 180° this change in the direction of the reflex-movement will not appear. At the point of reversal the streak-reflex will disappear and the pupil will be filled with light. If now the streak is turned at 90° the streak-reflex appears as a clear, thin and well defined line. The linear retinal image is now corresponding to B in Fig. 1.

The axis of the astigmatism can be ascertained in a more direct way than described in the preceding paragraph. When the observer's eye is placed at the point of reversal of the less hypermetropic meridian there will be a noticeable break between the direction of the streak-reflex in the pupil and the projection of the filament on the iris unless the streak lies in the principal meridian of the astigmatism, when this break disappears.

The amount of astigmatism can be determined by using spheres or cylinders.

In streak-retinoscopy the axis and the power can be ascertained by a method which shows certain similarity with cylinder-retinoscopy.

(a) *Axis.*—This can be ascertained in the two ways just described (1) by the apparent change of the reflex movement if the streak is placed in a wrong axis. This is comparable with cylinder-retinoscopy where the cylinder placed in a wrong axis shows a resulting astigmatism the axis of which will vary by altering the power of the cylinders. (2) By the break between the projection of the filament on the patient's iris and the streak-reflex in the pupil.

An easy and demonstrative way of ascertaining the axis of cylinders of higher power is the following: When the amount of astigmatism has been determined the cylinder is placed before the eye. It will now be observed that if the cylinder is in the correct position the streak reflex has disappeared. But if the cylinder is in a wrong axis the streak-reflex re-appears in a new direction, and by turning the cylinder one side or other around its correct position the streak-reflex will move. The axis of a plus trial cylinder has to be turned toward the streak-reflex, which indicates the plus axis of the resulting astigmatism.

The streak reflex is more marked in hypermetropic astigmatism

than in myopic ones, therefore it was suggested[13] to correct with spheres the more myopic meridian and use plus cylinders.

(*b*) *Power.*—For checking the power the filament is focused so that it should give a broad light-band of about 2 cm. width on the patient's face, and in contra-distinction to the streak-reflex, the shadow movement has to be observed. The basis of the test is the following: If the retinoscopic mirror is at the point of reversal of one of the two focal lines whatever the direction of the light-source or light-band, and whatever the direction of the swinging of the mirror may be, the shadow will travel in the direction of the other principal meridian. Expressed in other terms this means that the reflex is *compelled* to move in the one principal meridian if the mirror is placed at the point of reversal of the other principal meridian (Zwangsläufigkeit der Schattenbewegung). Now if the examiner has any doubt whether the true power of lens had been put before the patient's eye, he can ascertain it by turning the streak deliberately into a wrong axis. If the power of the lens is correct the shadow movement will not change its direction, it remains in the principal meridian. With this method spherical lenses are used for the test. In cylinder-retinoscopy the corresponding method is that the cylinder is turned into a wrong axis and the position of the resulting astigmatism, and its character are used for ascertaining the correct strength of the cylinder.

Different instruments and their use: As has been shown, in the streak-retinoscope the lineal or band-like character of the light-source is utilized. Any ordinary circular light-source can be converted into an elongated image by means of a cylindrical mirror, and Borschke, and MacNab constructed such retinoscopes. Borschke's retinoscope consists of a plano-cylindrical lens of +0·75D. power, and is silvered on the plano side. Through the cylindrical mirror the immediate light source becomes band-like. Besides this Borschke proposed a square form of the mirror, so as to cause a straight edged light-patch or rather a straight edged shadow on the patient's retina. The mirror projects an oblong light-patch. In higher degrees of ametropia the pupil will be lit up as soon as the edge of the light-patch reaches it. However, as the point of reversal is approached, the pupil will remain dark during the greater part, except the central area of the light-patch. In case of a quadratic mirror with a side-length of 40 mm., the pupil is lit up by the edge of the reflection if the amount of ametropia is about 4D. The size of the pupil has an influence on this estimation. With a narrow pupil the required lenses are stronger. Borschke's retinoscope has to be turned in such a position that the edge of the shadow, and the direction of the reflex-movement in the pupil coincide with the position of the light-band on the patient's face.

According to the *Amer. Encyclop. of Ophthal.*[10] in Angus MacNab's "automatic" or "consult the cut" retinoscope the mirror is cylindrical, and the effect on the illuminated area of the fundus is to produce a band of light instead of an image of the lamp. By means of milled wheels the mirror is allowed to rotate and the band of light on the fundus can be made to lie in the axis of the astigmatism. After a little practice the localization of the axis can be made to within five degrees, a matter of importance in examining young children. In a personal communication Mr. R. R. James[5] writes "Angus MacNab used a sort of refraction mirror which threw a beam of light in slit form, and he used to swear by it in estimating astigmatism and its axis."

I have tried plano and also concave cylindrical mirrors and experience has proved their usefulness.

In the slit retinoscope[6] the band-like element is the slit, which covers all but a narrow rectangular part of the mirror, and it can be rotated in any meridian. For example in a compound hypermetropic astigmatism "with the rule" the slit should be placed in a vertical position. When the refraction in this meridian has been determined, the slit is put at right angles to the meridian examined, in this example at 180°, and it will be found that the shadow has a sharply defined edge. If the slit is not in the direction of the axis, the shadow edge becomes ill defined. This makes it possible to find the axis of the astigmatism by turning the slit into a position where the shadow edge becomes sharpest. Then comes the correction of the astigmatism. For this purpose the slit should be placed in the meridian determined, in the above example at 180°, and further lenses placed before the eye until the point of reversal is reached.

In the slit-retinoscope the only band-like element is the slit, resp. the shape of the mirror, and therefore the light-source used should be such as not to compete with the aperture effect. A small circular source, *e.g.*, the smallest opening of the Lister ophthalmoscopic bulb is best. An oblong or band-like light-source may be a disturbing factor if the position of the lamp does not coincide with the direction of the slit.

The shape of the light-source needs particular attention, as in the commonly used bulbs the incandescent element is not circular, and its projection is rather elongated. The incandescent element shines through the frosted glass of the pearl bulbs, and this may become a potential source of error not only with slit retinoscopes but with any other method as well.

The relation of these three types of instruments:—A band-like element which can be rotated is common to all. In the streak retinoscope the original source of light is lineal, in the

Borschke and MacNab retinoscopes the source image, *i.e.*, the immediate source of light is band-like, and finally in the slit retinoscope the band-like element is restricted to one of the apertures. A comparison of these instruments in practice had shown that the streak retinoscope is superior in cases with undilated pupil. A dense lens nucleus, however, may give rise to difficulties. In cases with dilated pupil the cylindrical and slit retinoscopes are more useful. With Borschke's plano-cylindrical mirror the pupillary light is brighter than with the concave-mirror type cylindrical retinoscopes, but with the latter the loss of brightness of the pupillary reflex is more than balanced by the presence of a relatively bright dot in the centre of the pupillary reflex which indicates the point of reversal very sharply.

By using different instruments one comes to realize that good results can be obtained with any one of them, and that cases not suitable for a particular instrument are relatively rare. There are, however, cases in which the point of reversal is not sharply marked with a certain type of retinoscope and the use of another instrument may be helpful. In the slit retinoscope the plano and concave mirrors are built in in pairs, and the change over from one mirror to the other takes no time.

Streak retinoscopy, including cylindrical mirrors and slit retinoscopes, gives more reliable results with the use of spherical lenses alone than ordinary retinoscopes, and this enhances their practical value, especially in the pressure of work of an out-patient department. The axis and the power can be determined easily. The position of the axis is indicated by the position of the streak or slit, and it can be read on the instrument provided it is held vertically, or it can be read off on the trial frame. The latter is especially easy when Thorington's axis finder disc is used in the trial frame.

Streak retinoscopes are suitable for cylinder-retinoscopy too, and the axis of the resulting astigmatism can be made very distinct by turning the streak or slit.

In conclusion it can be said with Jackson that the limits of accuracy of retinoscopy depend on details of its execution, and the skill and patience of the observer; but it does not require any rare natural qualifications, to carry it, for many eyes to the extreme limits of accuracy.

In a larger proportion of cases it will discriminate sharply between the lenses which really best correct the ametropia and others which appear to give equally good subjective results.[4]

Exact retinoscopy needs considerable experience, but a thorough understanding of the principles involved, and a patient study of the eyes—as well as the appreciation of binocular functions, such

as the phorias, anomalies of the vergencies, size of retinal images, and some other factors—will render the prescribing of spectacles less of an art and more of a science.

Summary

A table of the optical power of obliquely crossed cylinders, and the implications of oblique cylinder ideas for retinoscopy with cylinders are presented.

The basis of streak-retinoscopy is a band-like retinal image of the immediate source of light, which can be rotated in the principal meridians of astigmatism.

Similarities exist between cylinder-retinoscopy and streak-retinoscopy as regards ascertaining the axis and the amount of the required cylinder.

A survey of different instruments of the streak retinoscope group, and their practical use is given.

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A CASE OF ANGEOID STREAKS OF THE RETINA*

BY

T. HARRISON BUTLER

THIS condition must be somewhat rare for until I examined the present case, I had never seen one in my own hospital or private practice. Nor could I find any member of the Staff of the Birmingham Eye Hospital who had any personal knowledge of the

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condition. Fortunately I had examined one or two examples at the Clinical Meetings of the Section of Ophthalmology of The Royal Society of Medicine, otherwise I might have been in doubt of the nature of my case. The chief interest lies in the fact that I was able to examine the fundi before there was any ophthalmoscopic evidence of abnormality, and also in the somewhat rapid changes that were observed subsequently.

On December 22, 1942, I examined in my consulting room at Birmingham, Mr. H. R. S., aged 37 years, a non-ferrous metal moulder. He complained that recently he had noticed distortion of objects with the right eye and diplopia.

Condition on examination

V.R.=6/9 partly with −0·75 D.Sph. = 6/6 mostly. V.L.=6/18 with + 1·5 D.Sph. and + 0·5 D.Cyl. axis 90° = 6/12 mostly.

Naturally, with a complaint of metamorphopsia a very careful examination was made of the fundi. Both appeared to be perfectly normal. There was one degree of right hypophoria, and six degrees of near esophoria.

There was a very hollow bridge to the nose so a Wassermann reaction was performed with a negative result. X-ray pictures of the sella turcica and of the sinuses were normal. There was no evidence of any general disease, and later on when the angeoid streaks were found examination shewed no trace of Paget's disease or of pseudoxanthoma elasticum.

Because the patient was complaining of diplopia he was sent to Miss Lavinge of the West Bromwich Hospital for orthoptic treatment. He started this treatment on January 7, 1943, and his vision was taken and found to be 6/30 and 6/24. Unfortunately this result was not brought to my notice and I did not see him again till July 1, 1943. It is obvious that between the dates of December 22 and January 7, that is to say in a fortnight, the visual acuity had fallen from 6/6 mostly and 6/12 mostly to 6/36 and 6/24.

On July 1, 1943, there had been a further deterioration in sight, especially in the right eye, which now had an acuity of less than 6/60. The conditions of the fundi that I found are shewn in the pictures kindly made for me by Messrs. Theodore Hamblin Ltd. in August, 1943, with the exception that the mass at the right macula originally suggested a large soft exudate rising up from the surface of the retina. This mass appeared to harden and become whiter. Unfortunately my Gullstrand ophthalmoscope had been put away out of danger from the blitzes, but I have no doubt that the mass projected into the vitreous region. The left macula shewed no abnormal changes. The white areas round the discs were first noticed on July 22. They at first appeared to become denser giving the appearance of a waxy mass with crinkled edges, and here

and there on the surface of the mass were nipple-like buds of dense white wax-like material. A suggestion of these buds is seen in the drawings.

The angeoid streaks are well shewn in the drawings and are quite characteristic. I think that they were rather more marked when I first saw them than they were three weeks later when the drawings were made. In addition to the major changes there was a diffuse choroiditis of the "pepper and salt" variety.

I last saw the patient on November 20, 1943. The vision of the right eye was 1/60 that of the left 6/12. The fundus changes were far less evident. The mass at the right macula had contracted down to a white nodule, and the streaks were less evident, especially in the left eye. Some of the original streaks would pass unnoticed if one did not know where to look for them.

I have had the great advantages of Mr. Law's experience in these cases, and he very kindly examined the patient on August 11, 1943. He found that the vision of the right eye was only finger counting at 1 metre. The left eye with his correction obtained 6/6. The

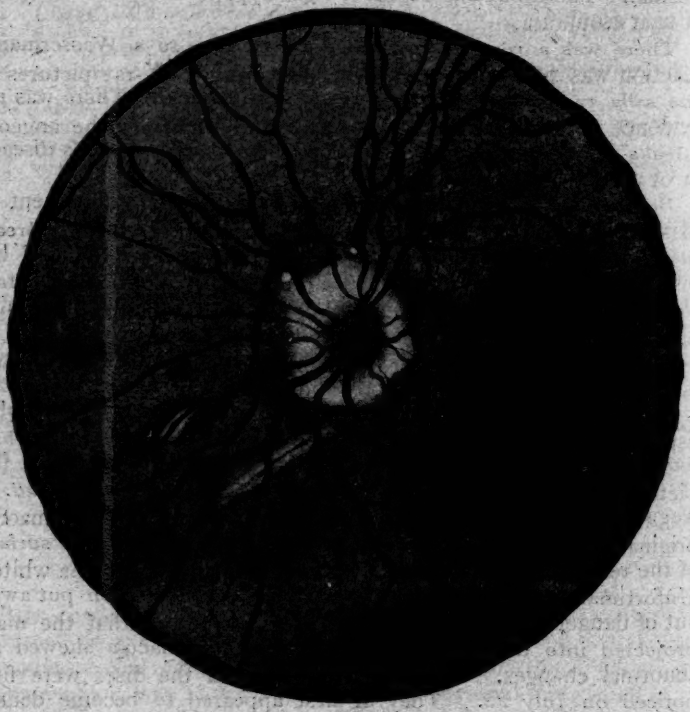


FIG. 1.

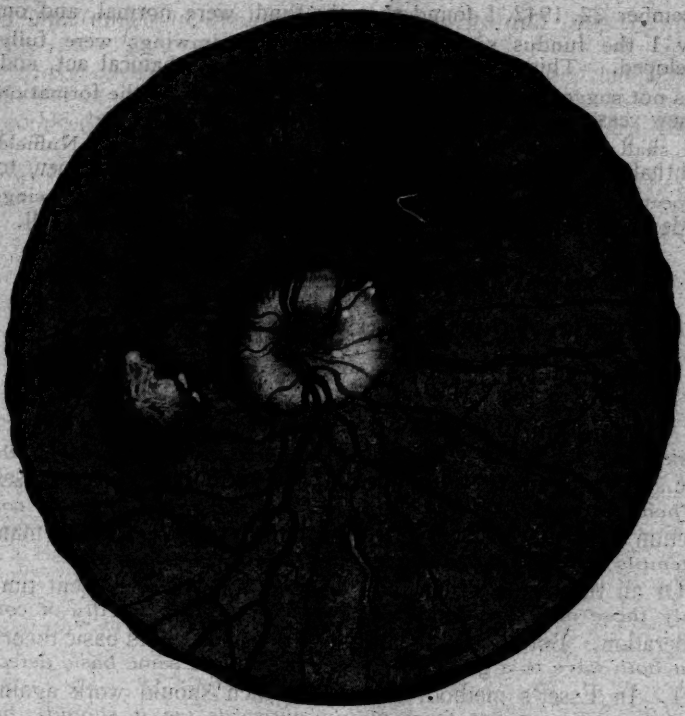


FIG 2.

right field shewed an absolute central loss to 8/2000 white, roughly central and of 5 degrees extent. The left field was normal. Mr. Law found the same fundus lesions that I have mentioned; he states that they are unusual and have probably arisen as the result of a subsiding exudative retino-choroiditis.

At the Congress of the Ophthalmological Society of the U.K. in 1938, Mr. Law read a most valuable paper which will be found in the *Transactions of the Society*, Vol. LVIII, part II, p. 191, in which he came to the conclusion that in a case he was able to examine after death the probable cause was folding of the retina with a deposit of pigmentary *debris* between the rods and cones and the pigment layer.

I think that my case supports Mr. Law's view because we know that the change took place with extreme rapidity (in a fortnight), if we are to take the evidence of the diminution of vision. But the deterioration in vision must have been largely due to the central macular lesion and judging by the left eye the streaks seemed not to have affected the vision. But we have the solid fact that on

December 22, 1942, I found that the fundi were normal, and on July 1 the fundus pictures shewn in the drawings were fully developed. This all speaks for some rapid mechanical act, and does not suggest a slow pathological process such as the formation of new vessels.

I shall present the original coloured drawings to the Nuffield Ophthalmic Institution where they will doubtless be open to inspection. This Institution also houses the original drawings made by Robert Doyne of the original case he described in 1889.

AN OPERATION FOR SHRUNKEN SOCKET

BY

DR. J. KRAUS

SHRUNKEN socket is a frequent aftermath of war injuries of the eye. Scarring, loss of conjunctiva, and adhesions are the causes. When we consider the operative procedures available for its correction we can see that they constitute a territory in which many attempts have been made and many failures have occurred.

Of all the available methods of operation at the present time, only those of Esser (modified) and Czapody are worthy of consideration. Both these methods have the same sound basic theory, but both have to a greater or lesser degree the same basic defect.

1. In Esser's method, the force which should work against shrinkage comes not from within outwards (as it should), but from without inwards, i.e., by closing the lids when the cavity is filled with "Stent," or other material. In Czapody's method the force is from within outwards, but in a linear direction (see Figs. 6 and 7).

2. The method of Esser does nothing and that of Czapody does very little to overcome the retraction due to shrinkage of the graft and adhesions which occur after covering the newly produced bare area. (Czapody makes several small incisions at the base of his covering graft.)

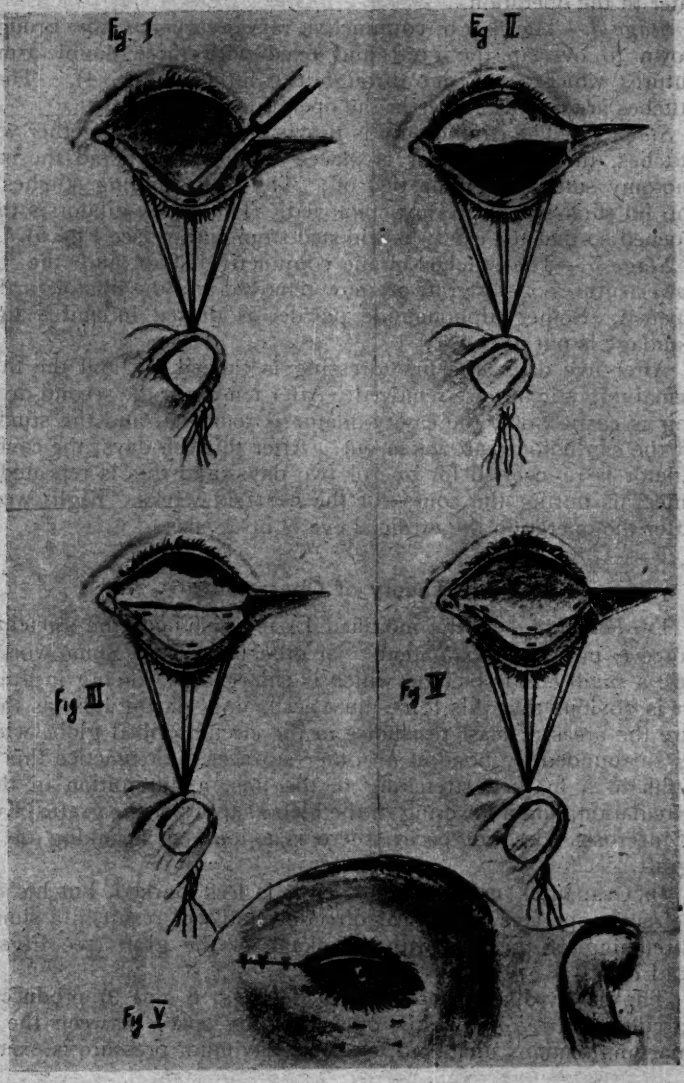
A method has been devised which is not subject to the faults of the above operations and is here described. A modified technique and a new design of cavity-dilator (see Figs. 8 and 9) are employed.

Details of operation (Note: This description applies to a lower lid only, but can be equally applied to an upper lid or both lids).

Stage 1.—After a large canthotomy to the orbital margin, three stitches are inserted into the lower lid margin, and with these the lid is pulled down (see Fig. 1). Two or three millimetres from the lid margin and parallel to it the conjunctiva is cut. It

is undermined to the equator of the cavity and lifted upwards (Fig. 2).

Stage 2.—Skin is taken either from the arm or from behind the ear of the same shape, but one-third larger than the newly produced raw area in the socket. The graft is prepared according



to the method of Le Fort-Wolfe (removal of fat and subcutaneous tissue). Careful haemostasis is essential, and the bare area is dusted with sulphonamide powder before the graft is applied. The graft is then neatly placed on the prepared area and is fixed to the lid by five double-armed sutures which come outwards through the lid (see Fig. 3). The two lower stitches will be removed later in the operation.

Stage 3.—The flap of conjunctiva raised earlier is now brought down to overlap the graft and fixed with three double-armed sutures which come out through the lid (see Fig. 4). These stitches are removed later in the operation.

Stage 4.—The canthotomy is provisionally drawn together with stitches, the cavity-dilator is placed in the cavity, and the canthotomy sutures are then tied off. The three holding stitches in the lid (first stage) are now removed. The cavity-dilator is then opened so that the cavity is widened from within (see Fig. 5).

Stage 5.—The stitches of the conjunctival flap and the two lower sutures of the graft are now removed and the dilator further opened. Some sulphonamide powder is dusted in and a light bandage is put on.

After five days, the first dressing is carried out and the three remaining stitches are removed. After ten days, the second dressing is carried out, the cavity-dilator is removed, and the stitches of the canthotomy are taken out. After thirteen days, the cavity-dilator is re-inserted for one or two days, and this is repeated at intervals during the course of the next six weeks. Eight weeks after the operation the artificial eye is inserted.

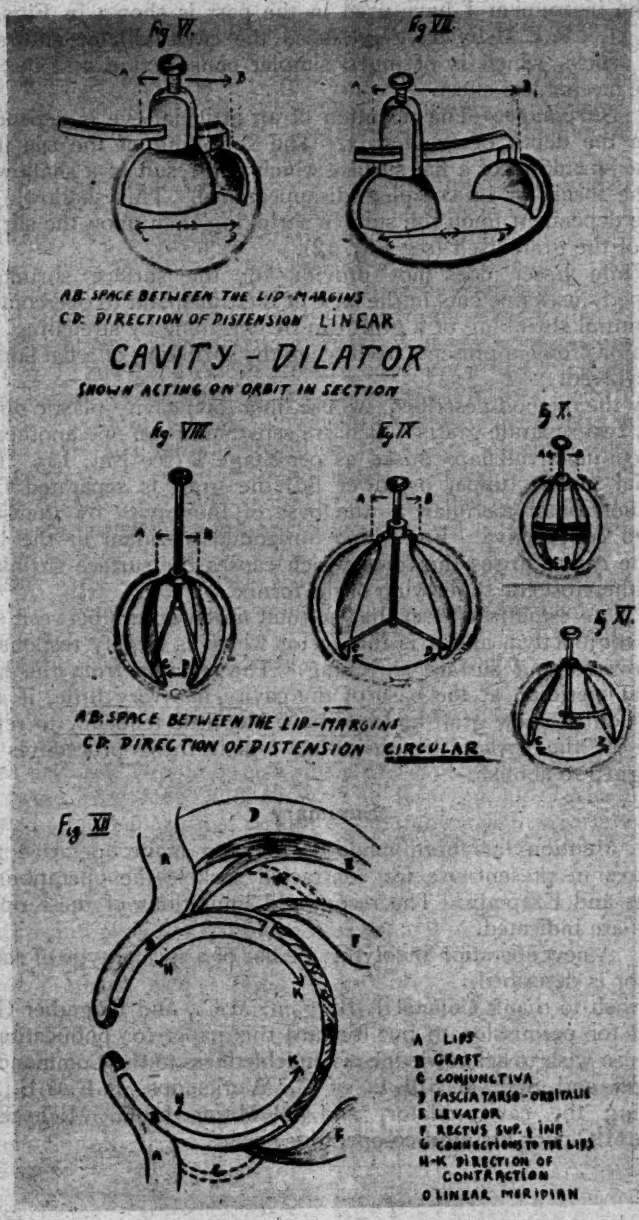
Theory of Operation

1. *Pressure.*—In the modified Esser's method, the stretching force is provided by " Stent " or other material. Some workers use a small elastic balloon which is enlarged by forcing in fluids. It is obvious that this force must act mainly on the lids, as these are the areas of least resistance in the circumscribed globe which is surrounded by bone at all other surfaces. In practice this results in a marked stretching of the lids, a diminution in their circulation, and a lowering of the blood supply of the graft. Even if necrosis does not occur, there is a marked shrinking of the graft.

In Czapody's method this danger is less marked, but his flap retractor operates in a linear direction and will result in a similar stretching of the lids with shrinkage of the graft (see Figs. 6 and 7).

The cavity-dilator here described (Figs. 8 and 9) produces a circular force from within outwards, the space between the lid margins remains unaltered, and the maximum pressure is exerted

CZAPODY'S FLAP-RETRACTOR
SHOWN ACTING ON ORBIT IN SECTION



well within the socket with diminishing force along the retractor blades towards the lid margins. The stretching of the socket is obtained without undue pressure on the lids.

The instrument I have used in the past is shown in Figs. 10 and 11. R.E.M.E. have produced the cavity-dilator shown in this article, which is of much simpler construction and has the same mechanical effect.

2. *Shrinkage.*—The retention of an artificial eye is dependent upon the depth of the fornix. The shrinking of the sac itself is the shrinking of a flat surface which will result in a shallowing of the fornix or its complete disappearance. This shallowing is more dependent upon the surface shrinking than upon the shrinking of the graft itself (see Fig. 12).

While Esser does not provide for the surface shrinking, Czapody uses fine cuts in the base of the transplant to overcome it.

Natural shrinking of a graft can be overcome by stretching, but a major problem presents itself when the shrinking of a flat surface is involved.

By the method described, we use, in a total cavity plastic operation, two separate grafts which are separated from one another by the conjunctival flaps raised as per Stage 1 (see Fig. 12). In a partial plastic (upper or lower lid) the graft is separated from the horizontal meridian at the base of the cavity by the same raised conjunctiva. From this horizontal meridian at the base of the cavity arises the force which causes the surface shrinking and therefore the shallowing of the fornix.

It is an established fact that no total union occurs between skin and conjunctiva, and it is this factor which is largely responsible for overcoming surface shrinking. The traction from the horizontal meridian at the base of the cavity has very little, if any, effect on the new graft and can have but little tendency to reproduce in the socket the shrinking which these procedures are designed to abolish.

Summary

1. Mention has been made of the two main operative procedures in present use for contracted socket—the operations of Esser and Czapody. The recognised limitations of these operations are indicated.

2. A new operation involving the use of a special type of socket dilator is described.

I wish to thank Colonel J. Biggam, M.C., and Brigadier G. I. Scott for permission to put forward this paper for publication.

I also wish to acknowledge my indebtedness to the Commanding Officer and Staff of 319 L. of C. Workshops, R.E.M.E., for making the cavity-dilator, and to Major I. C. Michaelson, R.A.M.C., for his kind co-operation.

REPORT ON TWO PAIRS OF BROTHERS SHOWING MARFAN'S SYNDROME*

BY

Capt. H. J. STERN, R.A.M.C.

Two pairs of brothers were observed in the Out-Patient Department of the Hadassah University Hospital, Jerusalem, who showed Marfan's syndrome—arachnodactyly with subluxation of the lens.

Family history.—Both parents were healthy. The mother was of a pyknic type, 35 years of age, and had given birth to 5 living children. No miscarriage or abortion. The father was 38 years of age, had never been ill, was a rather asthenic type and resembled the two oldest sons who are to be discussed here. The grandparents had all good vision, and were either living or had died in old age. Two younger sisters and one younger brother, aged 5, 4, and 1 year respectively, had normal eyes and did not show any abnormalities.

The oldest brother, M.L., was 14½ years of age. His height was 129 cm. (the normal height for his age is 150 cm.). He was undeveloped, had a feeble musculature, meagre subcutaneous tissue, and showed hypogenitalism, right cryptorchism and very small left testicle with scanty pubic hair. The thyroid was not palpable.

Heart and blood vessels:—Heart margins normal, pure sounds. Frequent extra-systoles. Marked hypertrophied veins on the chest. B.P. 95/75.

Lungs: N.A.D. Abdomen: Liver and spleen not enlarged. C.N.S.: Brisk reflexes.

He had a typical bird face with receding forehead and chin, and high tower palate. The skin of the face was dry and wrinkled; facies senilis. The limbs as a whole and especially the fingers and toes were very long and slim. The radiographs of the limbs showed a particular gross design of the trabeculae in a form which is frequently encountered in persons with endocrine disturbances. (cretins). The spine and the skull were normal, but the sella turcica was very small and showed a bony bridge connecting the anterior and posterior clinoid processes.

The basal metabolism was increased by 18·5 per cent.

Eyes: Visual Acuity R.E. 6/24; with −5·0 D.Sph.: 6/12. L.E. 6/24; with −5·0 D.Sph. −1·0 D.Cyl. 180 deg.: 6/12. Field of vision: slight bitemporal restriction of about 20 deg. for white and 10 deg. for colours. Corneae normal, but near limbus, separated from it by normal cornea were small whitish spots involving all layers (incomplete embryotoxon).

Iris: Slightly irregular shape of pupils, iridodonesis. Reaction

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to light and convergence normal; slow and insufficient mydriasis with homatropine. The right eye showed at "7 o'clock" two small bridge-colobomata of the iris, situated one near the other. In its temporal lower part the iris showed a peculiar spongy structure, making the parenchyma partly float in the anterior chamber like seaweed. Both lenses were luxated, in the right eye more than in the left one. The right lens was displaced up and in by about one-third of its diameter. The lenses were clear and no zonular fibres were visible. The right fundus was normal, the left disc showed a marginal excavation. The tension was normal.

The younger brother of the two, M.L., was 12 years of age, 119 cm. high (normal height for his age 139 cm.), and was on the whole very like his brother. In order to avoid repetitions only the points of importance will be mentioned:

Poor general development. Both testicles have descended but are very small; no pubic hair. The thyroid was palpable. Bird face with facies senilis, and tower palate. Slight atrophy of the left facial skull. The limbs were too long in comparison with the height of the child. Arachnodactyly. The radiographs showed the same gross design of the trabeculae. Strikingly small sella turcica with bony bridge. A most important fact must be mentioned here: that the father of the children, otherwise normal, showed the same abnormality of the sella. Basal metabolism increased by 19 per cent.

Eyes: Visual Acuity R.E.: Fingers at two metres; L.E. Fingers at 1 metre. No correction possible. Field of vision: L.E. slight temporal constriction of 10-15 deg. Both corneae showed the same spots near the limbus and the pupils the same irregularity as in the older brother. The iris in both eyes showed atrophic spots in the lower outer parts. Subluxation of both lenses, in a greater degree than in the brother. The lenses are displaced up and in by about one-half of their diameter. Fundus and tension were normal.

External reasons unfortunately did not permit examination of these brothers and their family as extensively as it could be done in the first pair.

Family history.—The children came from a family in which almost all members suffered from more or less severe endocrine disturbances. The mother suffered from an endocrine obesity. The oldest sister (aged 28 years) showed general myasthenia, turned-in legs, funnel-shaped chest, and general hormonal disturbances. In addition she had high myopia. A sister, aged 16, years had also high myopia and suffered from a very severe congenital kypho-scoliosis, marked funnel-shaped chest, severe general insufficiency and a congenital vitium cordis. One sister, aged 12, years was myopic, the same applied to the father; he and two brothers lived abroad and were said to be healthy. Another

brother, aged 18 years, had high myopia. The youngest sister, aged 6 years, was said to be healthy and to have normal eyesight.

Both our patients happened to be the same age as the other brothers described previously.

The older one, I.T., aged 14 years, was 172 cm. high (normal height 150 cm.). He was well developed, although of slack carriage and of an asthenic type. The palate was high and pointed, and he showed a marked arachnodactyly. The limbs, and particularly the hands and feet, were disproportionally long. Habitual subluxation of the humerus and the fingers. No other abnormalities were detected except a slight mitral stenosis. The X-ray examination showed the same changes as in the first pair: gross design of the trabeculae and small sella turcica.

Eyes: Visual Acuity R.E. Fingers at 1 metre, L.E. fingers at 1 metre. Subluxation of both lenses; the lower margin of the lens was visible in the centre of each pupil. The vision could therefore be corrected in two ways: both eyes saw with −5·0 D.Sph. −3·0D. Cyl. 90 deg. 6/24, and with +8·0 D.Sph. +3·0 D.Cyl. 90 deg. even 6/12. This correction, however, comprehending the aphakic part of the pupil, was not tolerated. With the slit-lamp both eyes showed numerous zonular fibres. There was a marked iridodonesis present, iris and fundus were otherwise normal. The field of vision and the ocular tension were also normal.

The younger brother, M.T., was 11 years old and strongly resembled his brother. His height was 150 cm. (normal height for his age 139 cm.), he had slim limbs and very large, slim hands and feet. Apart from the arachnodactyly, a high, pointed palate and subluxation of the finger joints were present. No other abnormalities were detected. The X-rays of this boy showed again the gross design of the trabeculae and a very small sella turcica.

Eyes: Visual acuity R.E. 6/36, L.E. 6/18. No correction was possible. Subluxation of both lenses, in the right eye the lens was displaced up and in by about one-third of its diameter, in the left eye the lower margin of the lens was only visible in strong mydriasis. Very slight iridodonesis. No change of iris or fundus. Field of vision and tension were normal.

Marfan's syndrome is attributed by many authors to an endocrine disturbance in the development with a hypophysary basis. Francois assumes that there exists a hypersecretion of the growth hormone. Hambresin and Van der Maele speak of an affection of the cells of the anterior horn of the spinal cord caused by a surplus of the growth hormone. Schilling describes a case showing striae of the skin in spite of leanness and points out that in cases of Cushing's disease, caused by a disturbance of the hypophysis, this symptom can also be present. Jeandelize and Drouet rightly point out that the hormonal theory of Marfan's

syndrome is founded only on speculation and that there are no biological tests suitable to prove the theory. Ida Mann remarks that the hormonal disturbances in Marfan's syndrome are probably only co-ordinated symptoms of a genotypic affection, producing general and ocular troubles which affect not only the mesoderm but the endocrine glands and the ectoderm as well.

The four cases presented here seem to corroborate this view. The first two cases show marked troubles of the hormonal apparatus, mainly of the sexual glands, and the whole picture is that of a severe endocrine disturbance. The other pair of patients come from a family in which troubles of the hormonal functions, affecting mainly the development of the skeleton, are marked and numerous. The most important points detected in these four cases are the finding of a pathological structure of the bones—seen for the first time in cases of Marfan's syndrome but known to occur in endocrine troubles—and chiefly the finding of a very small sella turcica (together with the fact that the father of one of the pairs, merely outwardly regarded as the carrier of the gen, showed the same small sella). These facts speak unmistakably for the hypophysis taking part in the syndrome. One must admit that the smallness of the hypophysis does not say anything about its abnormal function; but as long as there is no biological test for the function of the hypophysis one must take the findings described here as the first proof of an affection of the hypophysis in Marfan's syndrome.

Another important point is that one pair of brothers was abnormally small, the other pair abnormally tall. This means that the hypophysary trouble is of a very general character—the two pairs apparently represent two liminal cases of the disturbance, once in the sense of a inhibition, the other time in the sense of a stimulation of the growth, leading both, however, to the sharply defined complex of Marfan's syndrome.

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REPORT OF A CASE OF A PRIMARY CARCINOMA OF LACRIMAL SAC*

BY

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U.S.A.

and

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BECAUSE of the infrequent occurrence of a primary tumour of the lacrimal sac we feel justified in presenting the following case. Penman and Wolff[1] collected data on 64 cases reported up to 1938. They observed the following distribution pathologically:

Adenoma	1
Carcinoma	24
Endothelioma	4
Fibroma	2
Lymphoma	5
Papilloma	7
Plasmocytoma	1
Sarcoma	20

Spratt[2] gives the most recent summary of previously reported cases. The consensus of opinion of the best method of treatment is that of surgical removal of the tumour mass, followed by exposure to X-ray or radium. The prognosis is usually good, especially if there is no extension outside the lacrimal sac.

The patient is a 49 years old white male. He first noticed watering in the right eye in November, 1942. This condition persisted and one month later a tender swelling was noticed over the right tear sac. This swelling later became quite painful. There were no symptoms referable to the nose and throat. The watering persisted but at no time did the patient complain of purulent discharge in the right eye.

Patient was sent to the Ophthalmic Clinic by his panel doctor on March 22, 1943. Examination at this time was as follows:

Vision Rt. $-0{\cdot}50$ D.Sph., $+0{\cdot}75$ D.Cyl. $\times$ $85°=6/9$. Vision Lt. $-0{\cdot}75$ D.Sph., $-0{\cdot}50$ D. Cyl. $\times$ $180°=6/9$. Slight injection of palpebral conjunctiva right eye. Media and fundus normal both eyes. In the region of the right tear sac there was a mass about the size and shape of a bean. Mass was firm and slightly tender.

An attempt to irrigate the right lacrimal sac was unsuccessful and an examination of the nose at this time failed to reveal any pathology. In April, 1943, patient noticed a bloody discharge from the right nasal passage and a nasal obstruction in this area.

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Patient was admitted to hospital on July 13, 1943, for observation. The examination at this time revealed a great increase in the size of the swelling of the right lacrimal sac. This mass was very tender to palpation. An examination of the nose revealed a granular mass in the region of the right middle turbinate which was almost completely obstructing the right nasal passage. There was slight bleeding from this mass. A biopsy was taken of the intra-nasal growth and the following report was obtained:

"The material consists mainly of blood clot and fragments of oedematous fibrous tissue. At one point the clot shows early organization by fibroblasts. It is impossible from the material supplied to report on the malignancy. No tumour tissue was present."

On August 2, 1943, a dacryocystectomy was done with complete removal of the tumour mass. The mass had invaded the lacrimal bone but there was no evidence of any extension into the frontal sinus. At the time of operation the middle turbinate of the right nose was also removed. Both specimens from tear sac and nose were sent for pathological examination. The pathological report of the lacrimal sac follows:

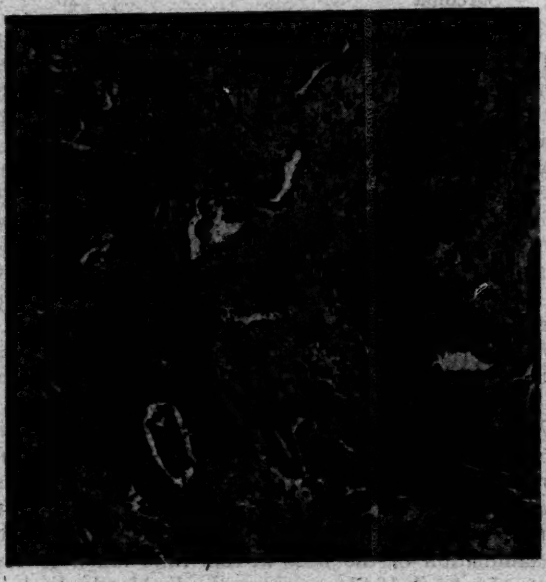

FIG. 1.

To show invasion of the submucosal tissue by columns of epithelium. Each column is limited by a layer of basal epithelium.

FIG. 2.

To show the rather oval epithelial cells which are found generally throughout the tumour.

"The tissue is largely composed of small oval, or rather spindle shaped cells with very scanty cytoplasm and dense hyperchromatic nuclei. These tend to grow in sheets of broad strands with very little stroma and to infiltrate widely through the oedematous sub-epithelial connective tissue. Very occasionally they are arranged around a small acinar-like space, and this very abortive attempt to form acini is evidence of their epithelial origin. The tumour has arisen from basal cells of the epithelium and histologically has some resemblance to an oat cell carcinoma of the lung. There is no calcification of blood vessel walls."

Turbinate from nose:

"The sub-epithelial connective tissue is invaded in some areas by tumour cells similar to those of the lacrimal sac. The tumour is likely to prove relatively malignant, but to spread by direct extension, rather than by distant metastases, and to react moderately well to irradiation."

On August 13, 1943, 6·9 mgs. of radium was inserted for 12 hours into the region where the sac had been removed, and 9·4 mgs. to region where middle turbinate had been removed. The subsequent post operative course was uneventful and the lacrimal sac wound and nose healed without any recurrence of the mass to date. When last examined, on October 20, 1943, patient was in good

health. Nose revealed no obstructive mass and the mucous membrane appeared normal. The incisional scar over the right tear sac was healthy in appearance and there was no evident recurrence of the growth. Patient no longer complained of watering.

Until the patient has been followed for a much longer period of time the results of the treatment administered cannot be determined.

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A CASE OF RUPTURE OF A RETINAL CYST CAUSING RETINAL DETACHMENT

BY

Major C. DEE SHAPLAND

R.A.M.C.

CASES of retinal detachment clearly due to the spontaneous rupture of a retinal cyst are not common and hence this case is deemed worthy of placing on record, especially so as it clearly showed that a retinal dialysis or disinsertion can be produced by such a rupture.

J. S., aged 28 years, a private of the 8th Black Watch, was sent to the Ophthalmic Department of the Royal Victoria Hospital, Netley, on September 18, 1943, on account of failing vision in the right eye noticed during the previous six weeks. The acuity of his right eye had been recorded as 6/6 unaided on his examination by a civilian medical board on April 20, 1940, and he was placed in Grade 1, being subsequently re-examined on May 16, 1940, and placed in Army Category A1. He was re-examined medically on June 4 and November 13, 1942, and no change made in his category. On August 2, 1943, the day before J. S. had first noticed the right vision to be misty, he had felt a sudden, sharp, shooting pain lasting some two to three minutes in the region of the right temple "just where the veins are" and felt giddy and faint. He was marching out of camp at the time in full equipment and wearing a steel helmet. He did not, however, report this occurrence and the subsequent blurring of his right vision to his unit M.O. until September 17, 1943.

On examination on September 20, 1943, the right eye was white, there were no keratic precipitates, the pupil was active and tension normal; a few coarse vitreous opacities were present below. Extending from 6.30 to 11 o'clock temporally was a flat detachment of the retina of recent origin with the macula involved, central

FIG. 1.

vision being reduced to 3/60, not improved. At the 7 - 9 o'clock periphery a prominent, thin-walled retinal cyst was present with ragged dialysis extending from 7.30 - 9 o'clock. The interesting feature exhibited in this case was a linear band of retino-choroidal pigmentary disturbance delimiting the periphery of the cyst above and below. This disturbance was such as is usually seen at the high water mark of static retinal detachments of long standing. That the cyst was of considerable chronicity can therefore safely be inferred. The wall of the cyst had evidently ruptured peripherally at, or just behind, the ora serrata and so produced a ragged dialysis of the retina which had initiated a spreading detachment over the temporal half of the fundus in the usual way (Fig. 1). The left eye showed no symmetrical cyst or dialysis, the fundus being quite normal and its vision standard unaided.

Operation was performed on September 24, 1943, under surface 4 per cent. cocaine and sub-Tenon's capsule 4 per cent. novocaine anaesthesia. The external rectus was detached and a barrage of surface diathermy applications at 70 ma. placed round the periphery

of the scleral surface marking of the cyst. One needle puncture at 40 ma. was made over the centre of the cyst and another at 6.30 o'clock, 12 mm. from the limbus, to drain the sub-retinal space under the spreading detachment. The patient was kept in bed in the Fowler position with both eyes padded for a fortnight and allowed up for an hour on the 15th day. The retinal detachment

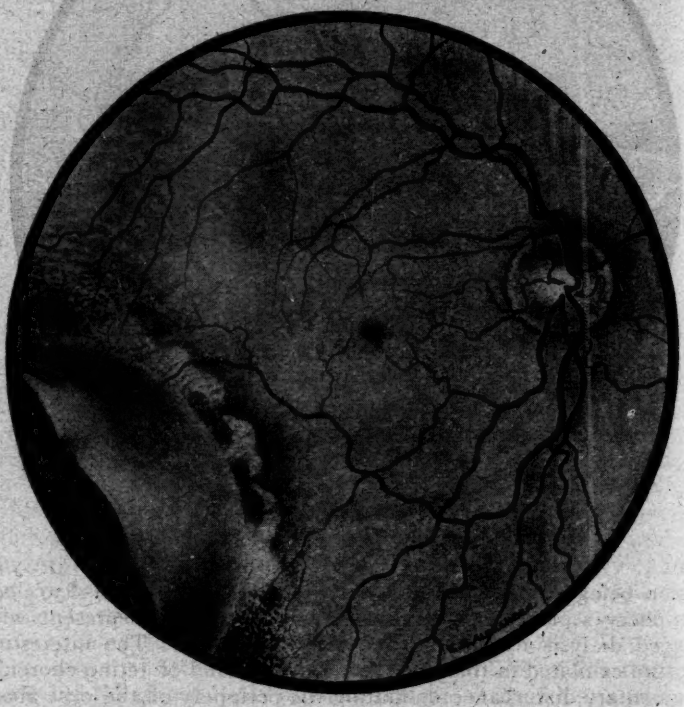


FIG. 2.

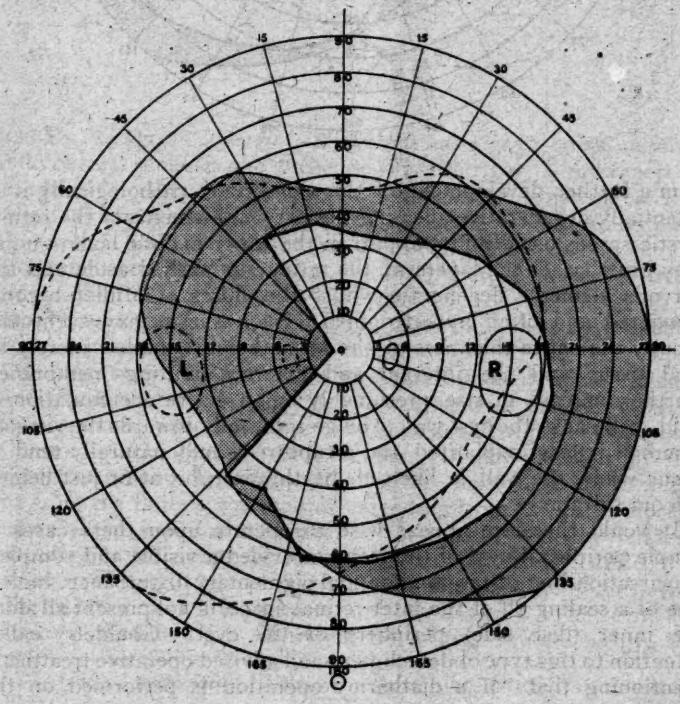
went back and the fundus appearance on the 25th day after operation is shown in the drawing (Fig. 2).

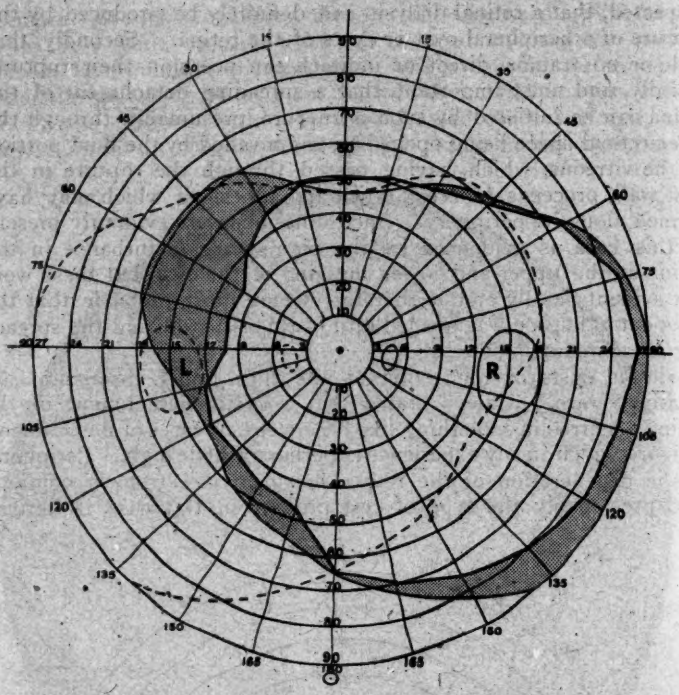
The cyst was smaller and outlined on its inner side by a zone of diathermy reactions. The contraction of the latter had appeared to pull down the wall of the cyst and so cause the whole to shrink somewhat. The dialysis, on the other hand, was still clearly visible and open. The retina was in place, central vision 6/24 partly, and the field full except for a defect on the nasal side corresponding to the diathermy reactions and the remains of the cyst.

The interest of this case, in my opinion, is that it clearly demonstrated three important facts. First, as I had long

suspected, that a retinal dialysis can definitely be produced by the rupture of a peripheral cyst or cysts of the retina. Secondly, that little or no trauma, direct or indirect, can occasion their rupture. Thirdly, and most important, that a spreading detachment of the retina can be initiated by such a rupture, presumably through the inter-retinal space being opened up and invaded by the fluid portion of the vitreous, which, having passed through the rupture in the cyst wall, proceeds to break down any adhesions which may have formed along its periphery. Such adhesions were evidently present in this case as evidenced by the pigmentary disturbance in the retina at the upper and lower margins of the cyst, but these were not evident nasally and it therefore seems most probable that the inter-retinal space was opened into in this situation and the spreading detachment so started.

Simple cysts of the retina of the type under discussion are relatively rare. Ridley[1] stated that a cystic detachment of the retina occurred in something like 3 per cent. of cases of detachment, a figure which in my experience is perhaps a little high. Peripheral cystic degeneration of the retina, however, is extremely common and presumably the type of cyst present in this case is derived





from a further development of this condition; pathologically it is essentially degenerative affecting the nervous elements of the retina. Cystic spaces usually first appear in the inner nuclear layer, and as they grow larger the layers of the retina are pushed aside and the nervous elements degenerate whilst the fibres of Müller become elongated and often hypertrophied. Such a cyst may eventually occupy the entire thickness of the retina being bounded merely by glial tissue and the internal and external limiting membranes. Further increase in size, presumably by an active accumulation of fluid, will cause the cyst wall to bulge internally towards the vitreous where it is least supported and a rupture would naturally tend to occur where the wall is likely to be thinnest, *i.e.* at or just behind the ora serrata.

It would therefore appear wise to operate upon these cases of simple peripheral cyst of the retina provided a visible and complete demarcation line of retino-choroidal pigmentary disturbance, indicative of a sealing off of the inter-retinal space, is not present all along the inner (disc side) periphery of the cyst. Goulden[2] called attention to this type of detachment and advised operative treatment, mentioning that "if a diathermy operation is performed on the

sclera overlying the cyst and the cyst is then evacuated, progress seems to be uniformly good." It would appear, however, to be a safer procedure in all cases and more especially if the cyst has ruptured, to place a ring of diathermy surface applications over the retina all along the inner periphery of the cyst, in addition to those over the cyst itself, before puncturing the latter. In this way the inter-retinal space should become securely sealed off and the risk of a spreading detachment obviated, even if through stretching of the cyst wall snug apposition of the latter to the underlying choroid is prevented.

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CONGENITAL PARALYSIS OF BOTH EXTERNAL RECTI TREATED BY TRANSPLANTATION OF EYE MUSCLES*

BY

JOHN A. MAGNUS

YORK

MISS P. W., aged 12 years. This child has a gross spinal deformity (kyphosis, scoliosis and torticollis) from birth. X-ray report at the age of 3 years (1933): Spina bifida occulta, involving all the cervical vertebrae and some of the upper dorsal, left-winged scapula.

I saw the child first on October 28, 1942, when I diagnosed: Bilateral abducens paralysis, right marked hyperphoria due to overacting right inferior oblique. (See Fig. 1). The vision is 6/6 in each eye, and the fundi are normal. The child has no binocular vision. She suppresses the right image.

On January 16, 1943, the left eye was operated upon under a general anaesthetic. I performed a recession of the left internal rectus (5 mms.) which was very contracted and thick. Following O'Connor's technique, I made a semi-circular incision in the conjunctiva around the temporal half of the cornea, about 10 mms. away from the limbus, the incision extending from "12 to 6 oclock." I exposed the superior and inferior recti, and split the tendons longitudinally for about 12 mms. with an old Graefe knife. A double-armed catgut suture was then run through the outer halves of the superior and inferior recti, and firmly tied. The segments were now dissected off their insertions and sewn beneath the

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external rectus, which was slightly advanced at the same time. (See Figs. 2 and 3).

I was very astonished to find a thick, healthy-looking external rectus muscle, which was at least twice as thick as normal, and appeared to come from below, running obliquely upwards, the

FIG. 1.—BEFORE OPERATION.

Congenital paralysis of both external recti treated by transplantation of eye muscles.

insertion being slightly higher than normal. The superior and inferior recti were much thinner than the external rectus, and more poorly developed than normal.

The right eye was operated upon on January 23, 1943. A similar recession and transplantation were carried out, as well as a myectomy of the right inferior oblique, which was reached from the lower

fornix of the conjunctiva, excising about 10 mms. of the muscle. The appearance of the right eye muscles was very similar to that found on the left side. The external rectus was again much thicker than normal, but more or less in the correct anatomical position.

After these operations, both eyes looked cosmetically straight, but the left eye showed a slight hyperphoria. There was, however,

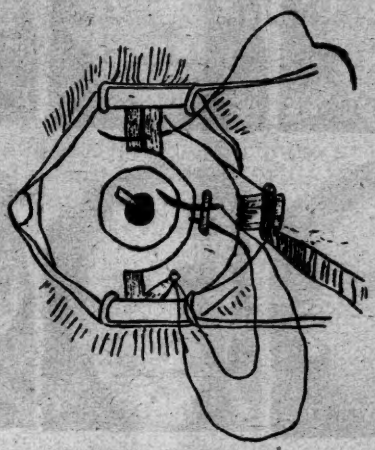

Fig. 2

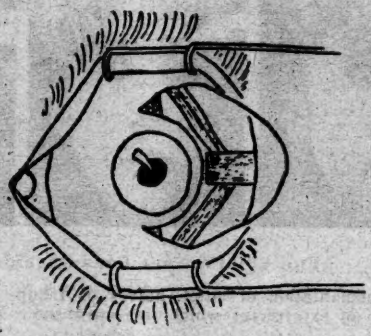

Fig. 3

practically no abduction. Two months later the hyperphoria of the left eye was corrected by myectomy of the left inferior oblique (6 mms. excised), and a partial tenotomy of the left superior rectus.

The end result is very satisfactory from a cosmetic point of view, but abduction is practically impossible (see Fig. 4). The patient has no double vision. The image of the right eye is suppressed.

FIG. 4.—AFTER ALL FOUR OPERATIONS.

1. Transplantation of outer halves of L.sup. and inf. rectus to insertion of ext. rectus which was advanced. Recession of L.int. rectus.
2. Transplantation performed on R. eye. Myectomy of R. inf. oblique.
3. Myectomy L. inf. oblique.
4. Two snip tenotomy of L. sup. rectus.

Comments

A case of bilateral abducens paralysis is reported, which was treated by transplantation of the outer halves of the superior and inferior recti to the insertion of the paralysed external rectus. This latter muscle was much thicker than normal, and showed in the left eye an abnormal anatomical position.

I thought that a possible explanation for the abnormal thickness of the external rectus (one would have expected a thin, frail muscle in a congenital paralysis of the 6th nerve), might be the innervation of the external rectus by the 3rd nerve instead of the 6th. (The internal and external recti always contracting at the same time). But Miss Ida Mann, of Oxford, informed me that this is embryologically impossible, because the 6th nerve is the motor nerve of the 3rd head cavity, and the 3rd nerve of the 1st head cavity. One cannot imagine very well the segmental nerve supply jumping two sections, nor does it seem likely that the muscle fibres themselves have crossed over in the cone of condensation of mesoderm, from which they all come.

I am therefore at a loss as to the explanation of this case, unless it is caused by the spina bifida occulta of the cervical vertebrae, nor why the transplantation did not bring about the expected abduction of the eyes.

My thanks are due to Miss Mann for her kind advice.

UNILATERAL FOLLICULAR CONJUNCTIVITIS DUE TO MOLLUSCUM CONTAGIOSUM*

BY

JOHN A. MAGNUS

YORK

THE rarity of this disease in this country justifies the publication of the following case:—

Mrs. F. E. W., aged 53 years. I saw the patient first on March 16, 1943, when she had an acute conjunctivitis and superficial keratitis of the right eye, which had developed after influenza. She was treated along the usual lines with guttae sodium sulphacetamide 30 per cent., boracic lotion and ung. merthiolate, 1 in 5,000, aolan injections and vitamin C, but the condition did not clear up during the next two months.

Various investigations were carried out:—X-ray sinuses, N.A.D.; Ear, nose and throat examination, N.A.D.; Mantoux, negative; Culture, sterile.

As they did not reveal the cause, the local treatment was changed, and guttae neoprotosil 10 per cent., and sol. hydrarg. oxycyanide, 1 in 5,000, given. The conjunctiva was painted with the alum

* Received for publication January 3, 1944.

stick and silver nitrate, 2 per cent. Sulphadiazine was given by mouth.

Another month elapsed. The clinical picture showed a temporary improvement, and then relapsed, the conjunctiva showing the picture of a chronic inflammation with a few follicles.

In June, 1943, about three months after I first saw her, I noticed several umbilicated, small tumours (the size of a pinhead) on the right upper and lower lids. Two of them were encroaching upon the lid margins. It was then that I first thought of molluscum contagiosum.

These tumours were removed for biopsy. Those at the lid margin were destroyed by electric cautery. A small piece of the conjunctiva showing follicular swelling was also excised.

During the next month the patient was treated with guttae sodium sulphacetamide, 30 per cent., and sodium sulphate solution, 12 per cent. Already, a fortnight after the removal of the small tumours, the conjunctiva had improved, and cleared up completely within a month.

The histological examination confirmed the clinical diagnosis.

Microscopical Examination

The conjunctiva shows diffuse infiltration with lymphocytes. This infiltration is confined to the sub-epithelial area (Figs. 1, 2, 3).

The fibrous tissue in this area is increased. The skin presents the typical picture of a molluscum contagiosum (Figs. 4, 5). This

FIG. 1.

FIG. 2.

FIG. 3.

FIG. 4.

FIG. 5.

consists of an accumulation of epithelial cells which are separated from each other by thin strands of the sub-epithelial connective tissue. The epithelial cells are swollen and hypertrophic.

All stages of degeneration can be seen. In some the protoplasm is thickened and converted into a well-defined reticulated structure, with the nucleus pushed to one side, and in others the protoplasm stains deeply with eosin, showing the typical, fully-developed homogeneous molluscum bodies. One can recognize quite easily how the molluscum bodies are discharged on to the surface of the skin.

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ANNOTATION

Absorbable versus Non-Absorbable Sutures

Localio, Casale and Hinton contribute to the International Abstract of Surgery (December, 1943, p. 457), an article describing suture materials which is of interest in connection with squint operations. Absorbable materials comprise those of animal origin of which the best known is catgut. This consists of the submucosal layer of the small intestine of sheep, strips of which are dried, stretched and twisted into a string, and sterilised. If the latter is done by chemicals (chromic acid or a solution of an iodine compound), there is danger of incomplete sterilisation, and Meleney and Clock were able to culture gas forming spore-bearing organisms from a high percentage of catgut supposedly sterile. Heat sterilisation, on the other hand, causes the material to lose some of its tensile strength. Absorption of catgut is a complex process which has not yet been fully explained. The rate of its occurrence is increased in the presence of infection and is slowed by impregnation with chromic acid. Since this is not complete, however, in the coarser strands, it is found, contrary to expectation, that fine chromic catgut is absorbed more slowly than the coarse variety. Silk is the best known non-absorbable suture material, and it has the advantage of being more easily sterilised, and of having its tensile strength increased by autoclaving, though boiling seems to weaken it a little. Linen, on the other hand, appears to decrease in strength on autoclaving and to increase on boiling. Cotton is variable in its tensile strength, owing to variations in the diameters of different varieties of the same stated sizes, and to differences inherent in the materials used. It will not suffice, therefore, for the surgeon to rely on "just any cotton." It is recommended that cotton be wound on machine bobbins which are sterilised by boiling for ten to twenty minutes, and used wet. Handcraft cotton 000 has a tensile strength of 2·5 lb. and can be used for ligating small vessels. The 00 size has a tensile strength of 2·75 lb. and the 0, one of 3·25 lb. Although the tensile strength of silk, size for size, is greater than that of cotton, the decrease of strength of silk and the increase of cotton on wet sterilisation make them comparable.

In America, the trend, in general surgery, has been towards the use of non-absorbable sutures for the following reasons. The chemicals used in preparation of catgut cause necrosis of tissues, interference with healing and a greater exudative reaction. Formation of fibrous tissue is also more rapid with silk than with catgut, and the incidence of wound infection in a series of controlled experiments on dogs was twice as great when catgut was employed. Allergy is another factor which has to be considered; thus Hinton showed that 8 per cent. of cases treated intradermally with sheep-gut antigen showed positive reactions and some other observers,

that after sensitising guinea pigs to catgut, about one third showed disruption of wounds and another third abnormal healing. In a control series of twenty-six animals, all but one healed normally. It is only fair to say, however, that these results are disputed by other authorities. Important points in the use of silk are that it should be twisted rather than braided, untreated or only lightly waxed, should be of the finest material possible and be used as interrupted rather than continuous sutures.

It would be interesting to know the views of ophthalmic surgeons on the issue of silk versus catgut for buried sutures in squint operations, The experience of the writer makes him favour the use of white silk as causing less post-operative reaction and a firmer union of the parts sutured.

COUNCIL OF BRITISH OPHTHALMOLOGISTS

Annual Report, 1944

THE Council presents its report for the year 1943-1944. Owing to the intended reorganisation and reconstruction of the Council, no change in the personnel of its officers was made at the first meeting of the new session.

The Council records with regret the death of Mr. Leslie Paton, an original member.

The Council has completed its deliberations over the Draft Articles of Association of the British Orthoptic Society, and the Articles, Memorandum, and Bye-Laws have now been approved in their final form.

The sub-committee of the Council appointed to consider the question of reconstitution of the Council of British Ophthalmologists completed their deliberations and presented their report which has been accepted by the Council. They have been instructed to consider details.

A sub-committee was set up to consider the Draft Scheme for a National Eye Service drawn up by the British Medical Association. Its representatives attended a Joint Meeting held at the B.M.A. House to discuss the Scheme.

Representatives of the Council attended a meeting with the Council of the Royal College of Surgeons, to discuss the institution of a higher diploma in Ophthalmology. A sub-committee was appointed and drew up a scheme, which has been accepted by the Council and will be forwarded to the Royal College of Surgeons.

The Sub-committee appointed to consult with the Joint Committee of the three Royal Colleges over the question of Consultant status and Assumption B of the Beveridge Report met and, after discussion, appointed their representative in the person of the Honorary Secretary, who has attended the Joint meetings.

The Council decided to participate in a scheme for a Joint Secretariat and Office Accommodation arranged by the Royal College of Surgeons.

The Council has appointed a representative to serve on a Committee of the Royal College of Physicians for the revision of "The Nomenclature of Diseases."

A sub-committee was appointed to draw up a report upon the Regionalisation of the Ophthalmic Services of London. This report has been modified by the Council and will be forwarded to the Association of the Ophthalmic Hospitals of London.

A sub-committee has been appointed to draw up a report upon the Ophthalmological aspects of the White Paper, which report after approval will be submitted to the Joint Committee of the three Royal Colleges.

The expenses of the Council have, as in the past, been met by contributions from its members.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM

THE Annual Congress of the Ophthalmological Society of the United Kingdom was held at the Royal Society of Medicine on Friday and Saturday, March 31 and April 1, 1944. Considering the difficult circumstanes there was a very good attendance, especially of visitors, the latter consisting mainly of ophthalmic surgeons of the American Armed Forces. The President, Dr. H. M. Traquair, M.D., F.R.S.Ed., opened the proceedings with a short address of welcome to members and visitors, and followed this by the Presidential address upon "The Nerve Fibre Bundle Defect," an illuminating discourse upon an aspect of the subject of which the President is an acknowledged master. The discussion which followed was upon "ocular psychoneuroses" (excluding Miners' nystagmus), opened by Mr. R. C. Davenport and Squadron Leader J. H. Doggart on general lines. The subject was developed along special lines by many members and visitors, the former including Professor Riddell, Mr. O. Gayer Morgan, Major Stenhouse Stewart, and Squadron Leader A. G. Palin, and the latter, Air Commodore R. D. Gillespie, and Dr. D. W. Winnicott, who enlarged upon the children's aspect.

The first part of the afternoon was devoted to a joint clinical meeting with the Ophthalmological Section of the Royal Society of Medicine. A large number of very interesting cases of all kinds were examined, and subsequently described and discussed. After the discussion Dr. Andrew Paterson read a paper upon "concentric restriction of vision from unilateral cerebral lesion," which was well

illustrated by perimetric observations. Dr. Kate Hermann then gave her paper on "sphenoidal mucocele as a cause of the ophthalmoplegic migraine syndrome," which was particularly interesting. The rapid recovery described after operative interference was remarkable. The session closed with a paper by Captain G. Blum, Miss J. M. Dollar, and Professor Sorsby on the subject "the use of plastic material for scleral wounds," in which the result of trials of various plastics for sealing scleral wounds in experimental animals was described. The paper was in the nature of a preliminary communication; specimens of the plastics used were exhibited.

On the second day the session opened with a Discussion upon "virus affections of the eye." This was opened by a visitor, Dr. C. H. Andrewes, who described the nature of viruses in general, and gave an interesting account of the latest work upon the subject, and by Professor Sorsby who specialised upon the ophthalmological aspect. The subject was well discussed; the speakers included Colonel R. E. Wright, Mr. A. F. MacCallan, who spoke on trachoma, Mr. H. Neame, who gave an account of herpes, particularly in its relation to chicken-pox, and Dr. A. Loewenstein.

The Discussion was followed by the Annual General Meeting of the Society. The Honorary Secretary, Mr. F. W. Law, read the minutes of the last Meeting, which were approved; the Annual Report of the Society was received and also approved. The Honorary Treasurer, Sir Arnold Lawson, made a statement on the Balance Sheet, and officers for 1944-45 were elected. A vote of thanks to the President and officers was carried with acclamation; to which the President briefly replied. The meeting was followed by the presentation of the Report of the Council of British Ophthalmologists, which was discussed and finally accepted. A copy of the Report appears elsewhere in this issue.

The Saturday afternoon was devoted to papers, of which there were five. Mr. E. Wolff gave a most interesting account of "hyaline bodies in the intra-ocular fluids and tissues," and Mr. M. L. Hine reported "a sequel to the case of spontaneous cure of retinal glioma," in which he described the occurrence of this neoplasm in the third generation. Major King and Major Samuel gave a paper upon "fractures of the orbit," well illustrated by X-ray photographs, in which the methods of treatment of the condition were outlined. Major J. Minton gave a general account of "ophthalmic experiences in the East," and Major Philps described the use of "radon seeds in the treatment of retinoblastoma."

It was a valuable and enjoyable Congress, and many of the papers gave rise to interested discussion and comment. All the proceedings together with a report of the Joint Clinical Meeting will appear in the Transactions of the Ophthalmological Society of the United Kingdom for 1944.

ABSTRACTS

I.—CATARACT

(1) **McNabb, H. H. (Manchester).—The treatment of traumatic cataract.** *Trans. Ophthal. Soc. U.K.*, Vol. LXII, p. 207, 1942.

(1) **McNabb** recommends expectant treatment as a general principle in traumatic cataract. The age of the patient is a factor in deciding the treatment. In children absorption of the opaque lens matter will generally proceed without rise of intra-ocular pressure. Rarely is evacuation of the opaque lens matter necessary on account of secondary glaucoma. When this is so evacuation must be done cautiously and easily to avoid vitreous loss. The author states that sepsis as a complication of penetrating wounds of the eye has been reduced at the Manchester Royal Eye Hospital by dusting the wound with powdered sulphapyridine, and giving this drug by mouth. Many cases of infection of the anterior part of the eye cleared up, but the author did not see recovery when the vitreous had become septic.

Copper and brass in the lens may cause little reaction, and iron and steel may give rise to no trouble for a long time, but in most cases siderosis occurs eventually. Glass and porcelain may cause no trouble. A thorn and a wooden splinter frequently produce infection. If there is much irritation of the eye the foreign body should be removed from the lens at once. In cases where it is embedded in the lens and there is only a localized opacity it is better left alone, whereas if the lens is densely opaque removal is proper. A small foreign body protruding from the capsule associated with a localized opacity is better left if the eye is quiet, for its removal will re-open the capsule and may cause further opacification.

H. B. STALLARD.

(2) **Black, G. W. (Leeds).—Results of treatment of traumatic cataract.** *Trans. Ophthal. Soc. U.K.*, Vol. LXII, p. 215, 1942.

(2) **Black** surveys the results in 40 cases of traumatic cataract treated at the Leeds General Infirmary during the years 1932-42. Thirty-four of these showed perforating corneal injuries and in 15 an intra-ocular foreign body was found. Six were concussion injuries. He discusses the incidence of deviation of the eye and the pathology of lens remnants. In 22 cases vision was reduced to either hand movements or counting fingers at a short distance, and with no possibility of improvement without further operation.

The absence of retinal detachment as a complication of traumatic cataract from perforating injuries deserves mention. In 18 cases with stationary cataracts and with aphakic correction, the average vision is 6/18 in this series.

The author comments that blast from aerial bombs may rupture the globe and severely damage the retina, but does not produce a simple concussion cataract. He discusses the advantages of uniocular cataract extraction in these cases. The recovery of visual field outweighs the disadvantages of diplopia which the patient is generally able to ignore by day but may be troublesome by night. When a contact lens is worn over the aphakic eye the majority of patients require some orthoptic training to overcome the heterophoria present in these cases.

The author takes a conjunctival swab of penetrating wounds of the eye and is guided by this in giving appropriate chemotherapy. Full dilatation is essential. In severe inflammation subconjunctival injections of atropine and adrenaline should be given.

H. B. STALLARD.

II.—MEDICAL OPHTHALMOLOGY

(1) **Wise, G. (New York).—Ocular rosacea.** *Amer. Jl. Ophthal.*, Vol. XXVI, p. 591, 1943.

(1) **Wise's** paper contains an admirable survey of the clinical features and a discussion about the aetiology of ocular rosacea. This disease affects the eyes after its manifestations on the face. At present its cause is unknown. It is not a manifestation of riboflavin deficiency nor is the administration of riboflavin by mouth or intravenously of any value.

Gastro-intestinal disturbances, focal infection and endocrine disorders are not fundamental aetiological factors, but in some cases may be transient aggravating factors. Lowered gastric acidity is not specific for rosacea and its presence is of no special significance.

Except in the unusual and rare cases of severe ocular rosacea without secondary infection, most of the distressing symptoms and sequelae of ocular rosacea are due to secondary infection with staphylococci. This secondary infection can be controlled in most cases with 5 per cent. sulphathiazole or sulphadiazine ointment used locally several times a day.

H. B. STALLARD.

III.—OPERATIONS

(1) **Philps, A. S. (London).—The extraction of magnetic foreign bodies from the vitreous chamber of the eye.** *Trans. Ophthal. Soc. U.K.*, Vol. LXII, p. 169, 1942.

(1) **Philps** describes the technique he uses for extraction of intra-ocular foreign bodies by the posterior route. With Mellinger's giant magnet the foreign body is attracted towards the equator beneath the external rectus muscle. The tendon of the external rectus is divided between catgut sutures. A mattress stitch is passed antero-posteriorly through the superficial layers of the sclera and between the loops of this the sclera, choroid and retina are incised the desired amount with a keratome. The tip of a hand magnet is brought up to the wound and the foreign body extracted.

The author discusses the advantages of this method. He has thus treated 13 cases, and the visual results are as follows:

6/12 or better	5 patients
6/18	1 patient
6/60	1 „ (vitreous haemorrhage)
Finger counting	1 „ (vitreous haemorrhage)
Accurate light projection	3 patients
Loss of eye	2 patients

H. B. STALLARD.

(2) **Buxton, R. (Weston-Super-Mare).—Anaesthetics for ophthalmic operations.** *Trans. Ophthal. Soc. U.K.*, Vol. LXII, p. 179, 1942.

(2) **Buxton** recommends phenobarbitone gr. 1 daily during hospitalization before operation, and the same dose on the morning of operation, also the use of sedormid or soneryl at night. He favours dessicain 0·5 or 1 per cent. for surface anaesthesia and novutox with adrenaline for infiltration.

In the case of inflamed or congested eyes requiring a subconjunctival injection of novutox, a pledget of cotton wool soaked in cocaine 5 per cent. and adrenaline is applied to the part of the eyeball for injection.

H. B. STALLARD.

BOOK NOTICE

The Practice of Refraction. By Sir STEWART DUKE-ELDER. Fourth edition. J. and A. Churchill, Ltd. 1943. 15/-.

This is the fourth edition of a work that first appeared in 1925. This steady demand shows how much the book is appreciated and how much it is needed.

One important feature is that it combines so skilfully the theoretical basis of ametropia with the clinical methods used for deciding what correcting lenses may be necessary. The advantage of this is that the student and practitioner is encouraged to take a really intelligent interest in a subject that has sometimes become a by-word in ophthalmology, with the result that the practice of refraction of the eye in hospital clinics has more and more been delegated to the less well trained.

We have nothing but praise for Sir Stewart's work. He is such a clear exponent and his diagrams are simple and clear, so that anyone reading his book should have little trouble, and if he makes it his guide when attending a clinic in an eye hospital he should be able to prescribe spectacles and treat ametropia and muscular errors with success.

The last chapter is of help in that it supplies information as to the fitting of spectacle frames and the verification of spectacle lenses. This is a subject seldom touched upon in a manual of ophthalmology, and is one of considerable importance.

At the end of the work are collected together in an appendix, tables of refractive indices, metre angles and so on that make it unnecessary to refer to a multitude of books in which the information is scattered.

The exhaustive information of official requirements in the various Services is of help and considerable importance at the present time.

There is exposed in this manual a thoroughly reasonable attitude to the subject of ametropia: it is quite clear what are the methods the author thinks it wise to adopt, and the book is made complete by giving information on unusual means of dealing with the subject.

OBITUARY

ALFRED VOGT, 1879-1943.

PROFESSOR ALFRED VOGT died on December 10, 1943, at Oberägeri, after a long illness. He was born October 31, 1879, at Aargan in Switzerland and was educated at the Aargan Gymnasium. He pursued his medical studies at the Universities of Basle and Zurich, and graduated as M.D. in 1902. He married in 1906.

In 1909 he returned to Aargan as Oberarzt and remained there until 1918 when he was appointed Professor Extraordinary at the University of Basle becoming full professor in 1920. Here he remained three years when he succeeded Sidler Huguenin at Zurich and remained there until his resignation when his health gave way.

In 1911 Gullstrand presented his first model of the slit-lamp at the Congress of Heidelberg and was able to demonstrate by its means features in the structure of the lens and vitreous of the living eye. These observations were made by means of the ordinary binocular loupe.

The Czapski microscope had been invented many years before but it had yielded very little information. In 1916 Henker conceived the idea of linking the slit-lamp and microscope and ultimately by 1919 there was evolved the Zeiss model of slit-lamp as we now know it.

Vogt very soon appreciated its value and there proceeded from his clinic a continous stream of papers all of great interest and many of first-rate importance, starting with the discovery of the optical section in 1919. There followed in 1921 "The Handbook and Atlas of Slit-lamp Microscopy" which was published in German, French, English and Italian. Between 1919 and 1923 he had trained up a band of assistants who became adepts with the slit-lamp and there followed in September of 1923, 1924 and 1925 a congress of Ophthalmic Surgeons, from all over Europe, in Basle and Zurich, to be instructed in the use of the slit-lamp, and inspect the large material that he had collected. A new edition of the Atlas was planned in three volumes, and by 1931 two had appeared. It is a beautifully illustrated work and it is hoped that the third volume will be forthcoming.

He early appreciated the value of Gonin's discovery of the cause of detachment of the retina and published an extensive memoir in 1932. He introduced the use of the electro-cautery and later on electrolysis in the operative treatment of retinal detachment.

Vogt also carried out prolonged investigations into the causation of furnace workers' cataract showing that the active agent was infra-red rays. He introduced red-free light for the ophthalmoscopic examination of the retina. It will be appreciated how versatile he was and he was able to bring to his problems a deep knowledge of physics, biology, and general medicine.

Besides the number of ophthalmic surgeons that flocked to Zurich, he had an enormous international clientèle of patients. His powers of work were vast; he began his day by visiting the nursing homes where he had his private patients soon after six o'clock and then went to the University Clinic to operate and lecture, and did not have a meal until mid-day. He then received his private patients, working until late in the evening.

He had an extraordinary patience and persistence that was well suited for the tedious work of the slit-lamp investigation. He was a good operator and adopted the extra-capsular method of cataract extraction, with small iridectomy and the trephining operation for glaucoma.

One of the last honours paid him was the bestowal of the

Gullstrand Medal by the Swedish Medical Society of Stockholm in December, 1942. He had a taciturn and gruff manner, but in spite of this his personality was impressed on his patients who had the greatest confidence in him.

ARTHUR DONALD GRIFFITH

ARTHUR DONALD GRIFFITH, who died on March 4, after a protracted illness which he bore with characteristic calmness, was born on October 20, 1882. The son of Arthur Griffith, who survives him, he forsook the legal traditions of his family for the practice of medicine, qualifying in 1905 and obtaining the Fellowship of the Royal College of Surgeons in 1909. A student of King's College Hospital, he held various junior appointments at his training school and also at the Royal Free Hospital, and in 1909 was appointed to the honorary staff of the Royal Eye Hospital, where he had previously served as House-Surgeon, Registrar and Pathologist. He combined his duties at the Royal Eye Hospital with service as Ophthalmic Surgeon at the Westminster Hospital.

A member of the Territorial Army, which he joined on its formation, Griffith served abroad from the outbreak of hostilities in 1914 till 1919. He was Ophthalmic Specialist and Officer-in-Charge of Military Hospital, Hamrum, Malta, from 1914 to 1916, Surgeon Specialist at Salonika, 1916-17, and Senior Medical Officer, Faenza area, Italy, in 1918-19. He was mentioned in despatches and created Cavaliere Corona d'Italia. His War experiences are recorded in a valuable article on "Injuries of the Eye and Orbit" which appeared in the *Lancet* in 1916.

Returning to civil life, Griffith rapidly established himself as an exceptionally accomplished and judicious ophthalmologist. Equally at home in the laboratory, out-patient department and operating theatre, his special interests were stereoscopic vision and radiotherapy, as his many contributions to the Transactions of the Ophthalmological Society and Proceedings of the Royal Society of Medicine testify. These papers reveal the characteristic thoroughness that marked all his work. He was a fine linguist and had an exceptional knowledge of ophthalmic literature which made him an ideal contributor of articles on eye disease in successive issues of Short's Index of Prognosis. Glioma of the retina particularly fascinated him and it is fitting that a posthumous paper on the subject—to appear soon in these pages—should have been his last literary contribution. His services to his chosen speciality were perhaps greatest in his effective contributions towards the development of the research and teaching activities of the Royal Eye Hospital.

Griffith well nigh epitomised the ideal surgeon. A broad humanity permeated his personal relations; and his scrupulousness determined

Photo by Lafayette

ARTHUR DONALD GRIFFITH

UNIV. OF MICH.

his professional work. To his colleagues and assistants he was a sage counsellor to whom they invariably turned for advice and guidance. Always able to see beyond the immediate tangle, his assessment of difficult situations was at one and the same time balm and positive help. Scrupulousness combined with exquisite judgment made him not merely an outstanding, but the outstanding figure in any team, even if his reticence always forced him away from the limelight. The same qualities showed themselves in his work as an ophthalmologist; his diagnoses were never sudden inspirations, but the logical deductions of a meticulous examination, whilst his operations were beautiful examples of effortless deliberation. Richly endowed with that talent that is born in the stream of life, his was essentially the genius that flowers in quietude. It was for this reason that so much of his activities was little known outside the circle of those who were privileged to work with him. It is only they who know how much of the spade-work on the use of radium and X-ray therapy in ophthalmology was done by him and only his immediate collaborators who can assess how much Griffith, in his 35 years' service at the Royal Eye Hospital, contributed to the maintenance of established standards, to the elaboration of new levels of achievements and the formulation of new aspirations. At the Royal Eye Hospital which is perpetuating his cherished memory by a lectureship in optics, he will be remembered as a gentle colleague, a superb ophthalmologist and a formative force in the development of research facilities in ophthalmology. His colleagues feel that a quotation from Dante, whom in common with his charming Italian wife, he loved deeply and reverently is an apt epitaph:

"In te misericordia, in te pietate
in te magnificenza, in te s'aduna
quantunque in creatura e'di bontate."

ARNOLD SORSBY.

We have received the following appreciation from an old friend:

Few men are as averse from extremes as Arthur Griffith was. Over emphasis or exaggeration was decidedly distasteful to him. His words were chosen with care and deliberation. Vehement expression of opinion on his part was very rare indeed, whilst coarseness of thought or speech was anathema to him. His was a life of refinement of mind and spirit. The tenderness of heart and sensitiveness of his being were sometimes not known to those about him, for he was strangely shy.

When Griffith undertook a task, it was done with meticulous care. He could not be stampeded into any course of action. All his actions were under the government of his mind. He had amazing courage and forebearance. In spite of his shyness, he never evaded an issue just because of its unpleasantness. He weighed his actions and his words with the greatest care. What he said, he meant. He would not say a thing thoughtlessly and so perchance give hurt. The other person was invariably given the right of having his own opinion; and it was respected, even though Griffith might differ from it very greatly indeed.

The courage Griffith displayed at the close of his life was characteristic of his whole life. His desperately distressing malady would have put into a panic of fear any less courageous person. His responses were purely natural and instinctive apprehensions. Stark fear never had a place in his being.

Lurking behind a dignified and, at times, an austere presence was a delightful sense of fun and humour which his intimate friends often saw. He could laugh with the best. The more subtle the allusion, the more his appreciation.

Gentleness and tactfulness were ever his own. To the injured or the wounded, he was as gentle as a mother to her child. He was never soft or sloppy. His understanding of animals was a delight to behold. He understood them and they him—at once. He has been seen to crawl on his hands and knees to play with his friend dog for the sheer delight it gave him to give pleasure to the dog.

The world is indeed much poorer for his passing.

NOTES

Ophthalmological Society of the United Kingdom Officers 1944-45

THE following names were submitted for election at the Annual Congress on April 1. *President*, Charles Goulden; *Vice-presidents*, M. H. Whiting, Alex. MacRae, P. G. Doyne, John Marshall; *Treasurer*, Sir Arnold Lawson; *Council*, T. Keith Lyle, T. L. de Courcy, Air-Commodore P. C. Livingston, F. A. Anderson, George Black, Victor Purvis; *Acting Hon. Secretary*, Frank W. Law.

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University of Glasgow Post-graduate Lectures in Ophthalmology Whitsun Term 1944

DURING April and May a series of meetings will be held in the Department on Wednesdays at 8 p.m. The general arrangements will be similar to the series held last year. Tea will be served after the paper and a discussion will follow. The meetings will be open to all medical practitioners and senior students interested in Ophthalmology.

April 5, Mr. W. B. Inglis Pollock—"The Antiquity of Ophthalmology"; April 12, Professor A. J. Ballantyne—"Ophthalmology and the Diabetic Patient"; April 19, Dr. Laurance D. W. Scott—"The Diabetic Patient and Ophthalmology"; April 26, Dr. I. S. McGregor—"Prognosis in Squint"; May 3, Dr. J. A. Conway—"Ocular Therapeutics"; May 10, Dr. Dorothy Campbell—"Industrial Disorders of the Eye."

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Corrigendum

MR. JOHN FOSTER points out that in his letter (p. 152), the word elucidate has been mis-spelt, and the rest of the sentence should read "nature or progress" instead of "nature of progress."

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Special Notice

WE are asked by the Ministry of Information to state that the fact that goods made of raw materials in short supply owing to war conditions are advertised in this journal should not be taken as an indication that they are necessarily available for export.